सत्यमेव जयते

पत्तन, पोत परिवहन और जलमार्ग मंत्रालय
भारत सरकार

Ministry of Ports, Shipping and Waterways
Government of India

SAGARMALA
PORT-LED PROSPERITY

MARITIME INDIA VISION 2030

सत्यमेव जयते

प्रधान मंत्री
Prime Minister

MESSAGE

I am pleased to learn that the Ministry of Ports, Shipping & Waterways has prepared 'Maritime India Vision 2030' (MIV 2030). The document is a blueprint to accelerate the growth of our maritime sector over the next decade.

We have been blessed with a rich maritime heritage. To shape our maritime prowess into a robust engine of the nation's development, we have given top priority to port-led development. We firmly believe that the immense potential of our coastline strength needs to be harnessed to the fullest.

We have constantly been taking concrete measures aimed at adding pace to capacity building and enhancing efficiency of the sector. From policy initiatives and reforms for furthering ease of doing business to creating modern infrastructure of global standards to ensure modern multi-modal connectivity, we are striding forward with a holistic approach.

MIV 2030 emphasizes on further boosting performance and productivity of our maritime sector to pave the way for an even better future. To strengthen our position of eminence in the global maritime sector, MIV 2030 identifies over 150 initiatives across various maritime sub-sectors like ports, shipping and waterways.

These initiatives particularly focus on operational efficiency improvement, port-driven industrialization and creating safe and sustainable world class ports to address the growing trade volume needs, as well as reducing logistics cost through better evacuation and cost effective processes. I am confident that the initiatives will add impetus to our integrated efforts towards generating seamless prospects for business and entrepreneurship and create employment opportunities on a large scale.

The measures listed in the document will surely guide the way ahead towards a robust maritime sector and add strength to the nation's efforts towards building a prosperous and Aatmanirbhar Bharat.

(Narendra Modi)

New Delhi
फाल्गुन 03, शक संवत् 1942
22nd February, 2021

राज्य मंत्री
पत्तन, पोत परिवहन और जलमार्ग मंत्रालय
(स्वतंत्र प्रभार)
रसायन एवं उर्वरक
भारत सरकार

सत्यमेव जयते

मनसुख मांडविया
MANSUKH MANDAVIYA

Minister of State
For Ports, Shipping and Waterways
(Independent Charge) and
Chemicals & Fertilizers
Government of India

Foreword

Maritime sector plays a vital role in the overall economic development of a country. The Ministry of Ports, Shipping and Waterways, Government of India, has been working continuously for the promotion of its maritime sector through several marquee schemes since 2014 to step up investments. These investments focused on infrastructure, efficiency, services and capacity which continue to augment the handling of the ever increasing trade volumes and other requirements.

The Ministry has achieved significant progress since 2014 with improvements in many areas. The visible changes include improving efficiency of Major Ports, policy initiatives and reforms supporting trade and Ease of Doing Business, provision of multi-modal services for logistic movement in the country through inland waterways, expansion in ship-building & recycling activities and various measures to attract flagging of vessels in India.

The Ministry of Ports, Shipping and Waterways envisages continuing the improvements in sectoral performance and in that regard formulated an extensive exercise to define Maritime India Vision 2030. The exercise involved extensive consultations and brainstorming discussions with both public & private sector stakeholders to ensure that the vision captures initiatives that are implementable in a time-bound manner.

Maritime India Vision 2030 has identified 150+ initiatives across ports, shipping & waterways sub-sectors which will propel Indian maritime sector to its next level of growth in the new decade.

(Mansukh Mandaviya)

Date: February 12, 2021

Place: New Delhi

Room No. 201, Transport Bhawan, New Delhi-110001, Ph. : 011-23717422, 23717423, 23717424 Fax : 011-23724653

डा. संजीव रंजन
DR. SANJEEV RANJAN

सचिव
SECRETARY
भारत सरकार
GOVERNMENT OF INDIA
पत्तन, पोत परिवहन और
जलमार्ग मंत्रालय
MINISTRY OF PORTS,
SHIPPING AND WATERWAYS

PREFACE

Maritime India Vision 2030 (MIV 2030) has been prepared after extensive consultations with public and private sector stakeholders. 14 Thrust area groups across various maritime sectors were constituted at the start of the exercise, to discuss and identify initiatives and targets that would be targeted as part of Maritime India Vision 2030.

MIV 2030 identifies 150+ initiatives across various maritime sectors like ports, shipping and waterways. A detailed phasing and implementation roadmap has also been prepared for various initiatives to ensure tracking and monitoring. Policy & regulatory measures required to support the identified initiatives have also been defined as part of this exercise. Key targets under major initiatives were defined to improve performance and efficiency of Indian maritime sector to best in class levels.

Ports related initiatives focus on capacity augmentation, operational efficiency improvement, port-driven industrialization and creating safe and sustainable world class ports to address growing trade volume needs while reducing logistics cost through better evacuation and cost effective processes.

Shipping related initiatives focus on growing sectors related to ship building, recycling & repair as well as growing India's global stature as a maritime power. Several initiatives have also been identified to grow Indian flagged fleet, number of Indian seafarers through quality maritime education as well as supporting growth of nascent sectors like cruise tourism in the country.

Inland waterways has been growing rapidly in the country and MIV 2030 builds on this growth trajectory to increase multi-modality and share of inland waterway borne freight movement and passenger movement in the country.

MIV 2030 is a holistic exercise and a blueprint for sector stakeholders to work towards growing the Indian maritime sector and make it globally competitive.

(Sanjeev Ranjan)

New Delhi
February 19, 2021

SAGARMALA
PORT-LED PROSPERITY

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Ministry of Ports, Shipping and Waterways
Government of India

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EXECUTIVE SUMMARY

Maritime India Vision (MIV) 2030 – taking India to Global Maritime Leadership

India comprises a significant size maritime sector with 12 Major and 200+ Non-Major Ports situated along its 7500 km long coastline and a vast network of navigable waterways. The country's maritime sector plays a crucial role in its overall trade and growth, with 95% of the country's trade volume and 65% of the trade value being undertaken through maritime transport.

With the objective of propelling India to the forefront of the Global Maritime Sector, Ministry of Ports, Shipping and Waterways has formulated Maritime India Vision 2030 (MIV 2030), a blueprint to ensure coordinated and accelerated growth of India's maritime sector in the next decade. MIV 2030 has been formulated in consultation with over 350+ public and private sector stakeholders, comprising ports, shipyards, inland waterways, trade bodies and associations, national and international industry and legal experts.

250+ brainstorming sessions, study of 100+ global benchmarks & best-in-class examples, and analysis of 50+ Acts and Laws (including state & environmental) have led to development of MIV 2030.

MIV 2030 identifies over 150 initiatives across 10 themes covering all the facets of the Indian maritime sector and is a comprehensive effort to define and meet national maritime objectives.

India Maritime Sector: Key Highlights

Ports: Two Indian Ports, JNPT (#33) and Mundra (#37) have the distinction of featuring in the list of top 40 global container ports. India augmented its capacity by over 65% across all Major Ports in the last 5 years. Of the total cargo handled at Indian Ports, over 54% is handled at the country's 12 Major Ports.

Inland Water Transport: India has increased the modal share of cargo from 0.5% to 2% and has witnessed 19% year-on-year growth in cargo volumes over the last 5 years. India has over 5,000 km of navigable inland waterways under development.

Shipping: Globally, India ranks 2nd in ship recycling and 21st in ship building. India is ranked amongst the top 5 countries supplying trained manpower, with 17% growth in seafarers in the last 3 years.

6 Key Guiding Principles

The following key guiding principles were incorporated to define the MIV 2030:

1. Analyze current and future challenges to define initiatives
2. Drive innovation by utilizing latest technology
3. Create time-bound action plan
4. Benchmark to understand current standing and adopt best-in-class practices
5. Address capability building and human resources
6. Explore ideas to achieve "Waste to Wealth"

10 Key Themes

MIV 2030 outlines 10 key themes which are essential for India to secure its place at the forefront of the Global Maritime Sector:

1. Develop best-in-class Port infra structure

Total traffic handled at Indian Ports rose from 885 MTPA in 2010-11 to 1300 MTPA in 2019–20. The 12 Major Indian Ports handled nearly 54 per cent of the total cargo in 2019-20 and have witnessed just about ~4% CAGR growth in overall cargo traffic over last 5 years. Given the evolving global shipping market and 10-year traffic projections across commodities and regional clusters, India needs to upgrade its port infrastructure to increase its market share.

MIV 2030 has identified key interventions across 4 areas: brownfield capacity augmentation; developing world-class Mega Ports; development of transhipment hub in Southern India; and infrastructure modernization.

2. Drive E2E Logistics Efficiency and Cost Competitiveness

The overall logistics cost in India is higher than best-in-class benchmarks, primarily as a result of larger hinterland distances and higher unit costs. Port land industrialization, a means to bring industries closer to ports has started gaining traction with port based SEZ developed at JNPT and efforts across other ports. Sagarmala has outlined 200+ port connectivity projects to improve access to ports via road, rail, coastal & inland routes.

To be globally competitive, the India Ports must drive mechanization and adoption of technology to improve productivity and establish ancillary services (e.g. PGA nodal offices) within port premises to improve evacuation time.

Report outlines key interventions such as operational efficiency improvement, better evacuation, cost reduction, coastal shipping promotion and port land industrialization to drive competitiveness and efficiency.

3. Enhance Logistics Efficiency through Technology and Innovation

With an aim to achieve ~5% share in world exports, India's exports need to grow aggressively in next 5 to 10 years and it is imperative for Indian Ports to strengthen maritime capabilities and improve Ease of Doing Business (EoDB).

Key interventions identified to enhance efficiency include creation of a National Logistics Portal (Marine), functional processes digitalization across maritime stakeholders, Digital-led smart ports, and system-driven port performance monitoring.

4. Strengthen Policy and Institutional Framework to Support all Stakeholders

MIV 2030 has identified key interventions for improving governance mechanisms, amendments in existing legislatures, strengthening MCA, and promoting PPP, fiscal support, and financial resilience to enable overall sustainable growth of the sector.

5. Enhance Global Share in Ship Building, Repair and Recycling

Global downturn and rising competition have resulted in pressures on Indian ship building industry leading to a decline in its global share to <1%. While India is one of the market leaders in ship recycling, ship repairs is a very nascent market.

MIV 2030 has identified domestic demand channelization for ship building; development of common platforms for ancillary and marine design ecosystem; creation of ship repair clusters; and, promoting waste to wealth through increased scrap usage in Steel industry as key interventions to enhance the country's market share.

6. Enhance Cargo and Passenger Movement through Inland Waterways

India's modal share of freight moved on inland waterways has significant potential to improve compared to other best in class benchmarks. It is imperative to increase share of the country's inland waterways as they are highly economical and an eco-friendly mode of transport.

Key interventions identified to enhance passenger and cargo movement include terminal infrastructure and fairway development; fiscal and regulatory policies to encourage IW vessel operators and cargo owners; and promotion of Ro-Ro and ferry services in India.

7. Promote Ocean, Coastal and River Cruise Sector

The Indian cruise industry, though in its nascent stage, is growing at over ~35% due to multiple government interventions in the last 3 years. With global ocean cruise industry highly concentrated (80%+ share with top 3 players), attractive and stable policy framework is critical to attract global players to India.

Over the next decade, the Indian cruise market has the potential to increase by 8X driven by rising demand and disposable incomes. However, to do so, India will have to focus on the development of infrastructure to unlock demand. Optimized development and phasing strategy are necessary for development of this sector.

Key interventions identified for development of cruise sector include terminal infrastructure development; theme-based coastal and island circuits; cruise training academies; island ecosystem development; and operationalization of ferry and river cruise terminals on National Waterways.

8. Enhance India's Global stature and Maritime Co-operation

India's trade with the BIMSTEC nations has grown at an annual rate of 10%+. However, the geographical proximity and maritime connectivity offer an even higher potential for collaboration. With India being the largest BIMSTEC economy, the country needs to take a leadership position to drive cooperation and collaboration among the nations.

While multiple efforts are being undertaken to develop and strengthen connectivity (ferry, cruise, cargo) with neighbouring countries such as Bangladesh, Sri Lanka, Maldives, additional areas can be explored to further bolster maritime cooperation like strengthening permanent representation at IMO, common standards, and promoting "Resolve in India". Also, concerted efforts to drive collaboration with advanced maritime countries (such as the UK, US, Netherlands, etc.) are required.

9. Lead the World in Safe, Sustainable & Green Maritime Sector

India has set a target to achieve 40% national energy through renewable sources by 2030. Indian Ports need to be in adherence with International Marine Organization's alignment to 9 UN SDG which includes obligations on safe, efficient and sustainable ports.

To reduce environmental pollution, Indian ports have started multiple initiatives such as driving solar and wind energy adoption, Swachh Bharat Abhiyan, Swachh Sagar portal for waste management, etc. Also, to ensure safe work environment, Indian ports are striving to introduce multiple safety measures to prevent accidents/ incidents

In order to be in line with best in class practices, MIV 2030 has identified key interventions like increasing usage of renewable energy, reducing air emissions, optimizing water usage, improving solid waste management, Zero accident safety program, and centralized monitoring system identified to further bolster India towards leading the world in Safe, Sustainable and Green ports.

10. Become Top Seafaring Nation with World Class Education, Research & Training

India currently contributes to 10-12% of world seafarers but is facing rising competition from other countries in South East Asia such as Philippines.

Key interventions have been identified for promoting Research & innovation, enhancement of Education & Training, development of conducive ecosystem for seafarers and port led capability development.

Key Performance Indicators to Achieve Vision 2030

MIV 2030 – Key targets

	Key Performance Indicator	Current (2020)	Target (2030)
1	Major Ports with >300 MTPA cargo handling capacity	-	3
2	% of Indian cargo transshipment handled by Indian ports	25%	>75%
3	% of cargo handled at Major Ports by PPP/ other operators	51%	>85%
4	Average vessel turnaround time (containers)	25 hours	<20 hours
5	Average container dwell time	55 hours	<40 hours
6	Average ship daily output (gross tonnage)	16,500	>30,000
7	Global ranking in ship building and ship repair	20+	Top 10
8	Global ranking in ship recycling	2	1
9	Annual cruise passengers	4,68,000	>15,00,000
10	% share of Indian seafarers across globe	12%	>20%
11	% share of renewable energy at Major Ports	<10%	>60%

Impact of Maritime India Vision – 2030

MIV 2030 envisions an overall investment of INR 3,00,000 – 3,50,000 Cr across ports, shipping, and inland waterways categories. This vision roadmap is estimated to help unlock INR 20,000+ Cr worth of potential annual revenue for Indian Ports. Further, it is expected to create an additional ~20,00,000+ jobs (direct and non-direct) in the Indian maritime sector.

CHAPTER 1

Develop Best-in-class Port Infrastructure

Develop Best-in-class Port Infrastructure

1.1 Current Landscape

India has 12 Major Ports and 205 notified Non-Major Ports along its 7,500 km long coastline and sea-islands[1]. The ports are critical economic and service provision units.

The total traffic handled at Indian Ports has risen steadily from 885 MTPA in 2010-11 to 1307 MTPA in 2019-20[1]. India's Major Ports have witnessed ~4% CAGR[1] growth over the last 5 years and handled approx. 54% of the country's total cargo in 2019-20.

In 2019-20, approx. 25% of Indian cargo transhipment[1] was handled by Indian Ports and rest by International ports leading to lost revenue opportunities for India and a higher risk of trade dependence. Enabling a Transshipment hub in India will not only address the current revenue losses for Major ports but also help take advantage of an attractive position on global maritime routes.

Globally, seven of the top 10 ports in the world today (by container throughput) are Chinese ports[2]. Two Indian Ports (JNPT at 33, Mundra at 37) appear within top 40[2] ports category. There is a significant potential to develop port infrastructure in India and become competitive with other leading maritime nations such as US, China and other South-East Asian regions.

The shipping industry is moving towards mega-size vessels, with more than 40% of the order book in next 3-5 years accounted by ships of size 20,000 TEU and above[3]. While a Capesize vessel requires 18m+ draft, draft at Indian ports varies widely from 7m to 20m. Hence, Indian ports need to focus on increasing draft availability according to their respective cargo profile.

Considering the evolving shipping market, ship sizes, and cargo profile, it is essential for the Indian Ports to further strengthen port infrastructure and drive a greater share of global EXIM trade. Infrastructure is planning to be driven by careful analysis of cargo trends and forecasts.

1.2 Traffic Forecast and Capacity Augmentation

Four-pronged bottom-up analysis methodology was undertaken to develop 10-year traffic projections across commodities and regional clusters –

Origin-Destination (OD) analysis and growth drivers' study for each sub-category

- Mapping and analysis of industrial capacities (both existing & upcoming) across regions:
  - 1200+ coal-fueled power plants
  - 55+ Steel production plants
  - 50+ Cement production plants
  - 40+ Coal commercial blocks
  - 30+ fertilizer production plants
  - 25+ Petroleum refineries
- Assessment of key growth drivers and underlying variation factors for each commodity

Non-exhaustive

Assessment of ministry forecasts and policies for each commodity

- Assessment of potential impact of key policies and global trends on growth scenarios in the next 5 or 10 years (example):
  - Make in India Policy
  - National Green Tribunal
  - National Steel Policy
  - National Electricity Plan
  - DFCC launch and manufacturing shift potential from China
- Inputs from ministry departments for key commodities
  - Ministry of Steel
  - Ministry of Coal – Coal Vision 2030
  - Ministry of Petroleum & Natural Gas

3 Discussions with leading industry players and other agencies

- Discussion with leading industry players to incorporate their inputs across commodities
- Analysis of commodity-wise growth indicators and industry viewpoint from several domestic and international agencies:
  - International Energy Agency (IEA)
  - Niti Aayog
  - Petroleum Planning and Analysis cell
  - Invest India

4 Overall cargo volume growth triangulated basis regression analysis for both Major & Non-Major Ports

1 Indian Ports Association (IPA) Statistics report for FY20
2 2020 edition of Lloyd's List One Hundred Ports
3 Drewry Maritime Advisors Annual Review report 2020
4 Indian Ports Association (IPA) Statistics report for FY20

1.2.1 Commodity-wise Cargo Projections

Origin-Destination (OD) analyses were undertaken for key commodities including POL, Coal, Iron ore, Containers, Cement, Steel, and Fertilizers across regional clusters to arrive at 2030 traffic projections.

Three scenarios (High, Base, and Low) were developed for each commodity based on respective key drivers and applicable sets of assumptions such as industry trends, Govt. policies, capacity additions or decline possibilities, global market impact, inflation and others.

1.2.1.1 Petroleum, Oil and Lubricants (POL)

~430 MTPA[5] POL traffic was handled in 2019-20, constituting ~340 MTPA EXIM traffic with ~65% volume contributed by crude oil imports (Exhibit 1.1).

POL consists of three sub-categories - Crude oil, Petroleum Products and LNG. A bottom-up analysis and key driver's assessment was undertaken for each sub-category to estimate potential traffic volumes.

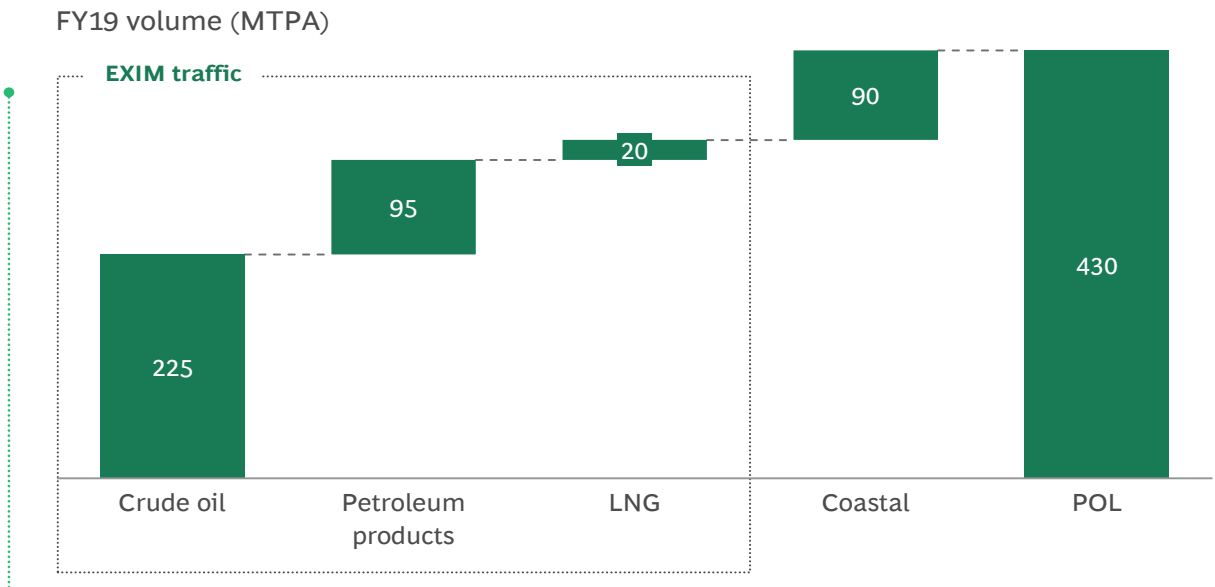
1 Crude oil:

Key drivers analysed[6]

Domestic refining capacity	• ~90 MTPA capacity additions via brownfield expansions across refineries such as ~26 MTPA at EOL Jamnagar, ~10 MTPA at IOCL Panipat, etc. (Exhibit 1.2) • ~75 MTPA capacity addition through potential greenfield refineries at Barmer (9 MTPA), Cuddalore revamp (6 MTPA), and Ratnagiri (60 MTPA) • Possible traffic variation in case of delays in land acquisition for ~60 MTPA new Ratnagiri refinery or delays in environmental clearances for ~20 MTPA brownfield Nayara Jamnagar refinery
Domestic oil Production	• Expected decrease by 1% to 3% CAGR in Indian oil production; or, increase by 1% CAGR in the most optimistic scenario (high case) (Exhibit 1.3) • Declining curve expected due to natural decline in field reserves and no new expected oil field

~315 -365 MTPA crude oil imports expected by 2030 (Exhibit 1.4)

Exhibit 1.1 | 2019 Traffic for Petroleum, Oil and Lubricants



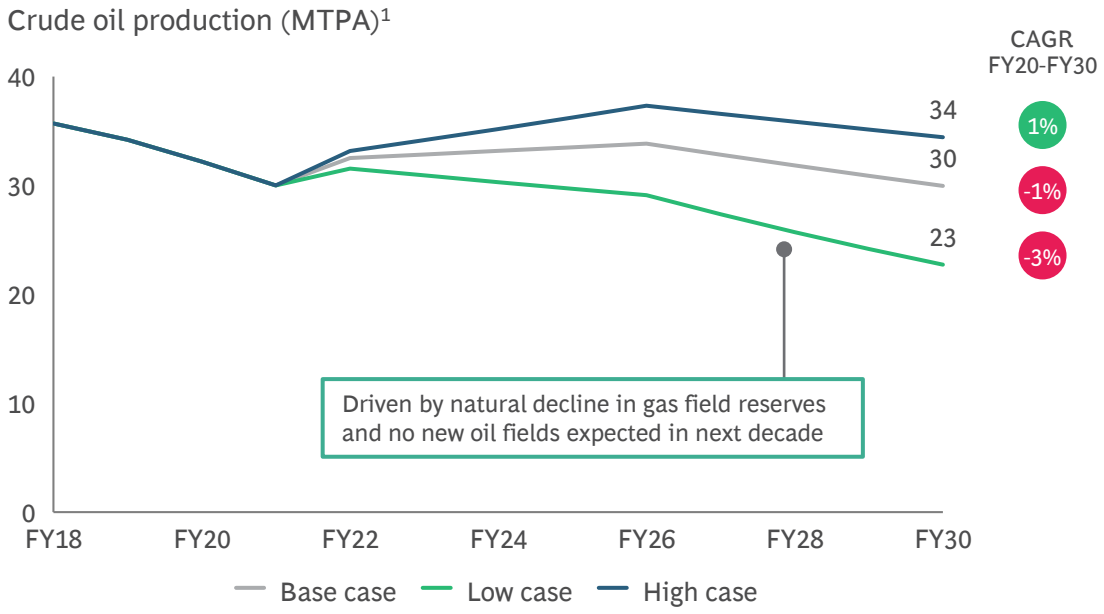
Source: IPA's Port statistics report, Transport Research Wing (TRW) - Ministry of Ports, Shipping and Waterways (MoPSW)

5 Indian Ports Association (IPA) Statistics report for FY20
6 International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW

Exhibit 1.2 | 2019 Traffic for Petroleum, Oil and Lubricants

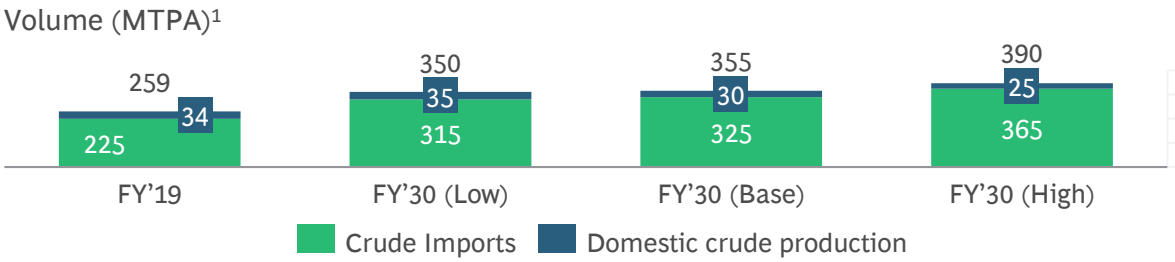
Refinery	Capacity addition (MTPA)	Tentative completion
IOC, Koyali/Vadodra	4	2023
IOC, Panipat	10	2021
IOC, Bongaigaon	3	2022
IOC, Paradip	5	2023
HPC, Visakh	7	2021
CPCL, Narimanam	8	2026
NRL, Numaligarh (BPCL)	6	2024
MRPL, Mangalore	3	2022
BPC, BORL-Bina	7	2021
RIL, Jamnagar*	7	2026
RPL (SEZ), Jamnagar	6	2021
EOL, Jamnagar	26	2025

Exhibit 1.3 | Domestic Oil Production to decline by 1% to 3%



1. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW

Exhibit 1.4 | Low, Base and High case scenarios for Crude Oil Imports



Key drivers

Key drivers/ assumptions	Low scenario	Base scenario	High scenario
Brownfield refining capacity	~80 MTPA capacity addition; Nayara expansion delayed	~80 MTPA capacity addition; Nayara expansion delayed	~95 MTPA capacity addition; ~80% Nayara capacity added
Greenfield refining capacity	~9 MTPA Barmer refinery operationalized	~6 MTPA via Cuddalore revamp + 9 MTPA Barmer refinery operationalized	~33% Ratnagiri capacity (20 MTPA) starting production + Barmer & Cuddalore refinery
Domestic crude production	~35 MTPA crude production: status quo capacity	~30 MTPA crude production: ~1% decreasing CAGR	~25 MTPA crude production: ~3% decreasing CAGR

1. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW

2 Petroleum products:

Petrol (MS), Diesel (HSD), and Liquefied Petroleum Gas (LPG) form around 70-75% of the petroleum products[8]. Other products include asphalt, bitumen, paraffin, etc.

Key drivers analysed[7]

MS/HSD domestic consumption

- Growth will primarily be driven by increasing alternate fuels adoption such as esterification, natural gas, etc. and amendments in policies such as National Green Tribunal, etc. (Exhibit 1.5)

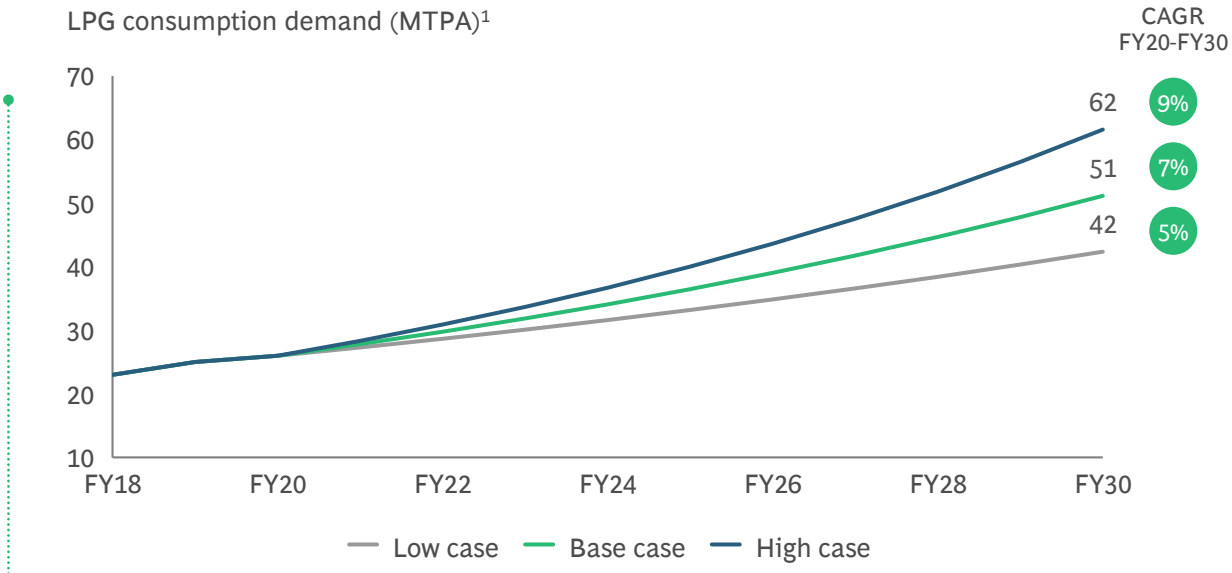
LPG domestic consumption

- Expected domestic LPG demand to be driven by GDP growth and piped gas penetration in urban areas
- Expected investment of INR 10,000 Cr for infrastructure enhancement to meet increased demand (Exhibit 1.6)

~50 to 125 MTPA exports likely by 2030; on the other hand, ~55 to 65 MTPA imports expected driven by LPG demand (Exhibit 1.7)

7 International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW
8 Indian Ports Association (IPA) Statistics report for FY20

Exhibit 1.5 | LPG Consumption Demand to increase between 5% to 9%



1. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW

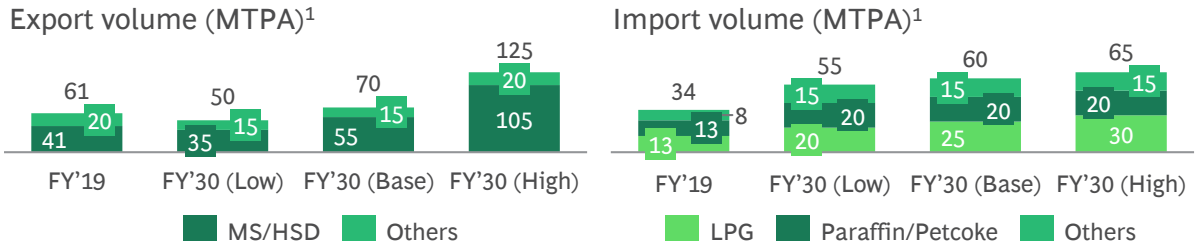
Exhibit 1.6 | LPG infrastructure investment

More than 10000 Cr. Investment underway in enhancing infrastructure

Company	Asset	Investment (Cr)
IOCL	Pipeline (Deendayal to Gorakhpur)	9,000
HPCL	LPG terminal expansion	1,000
IOCL	LPG infrastructure in North East	286
Energy Infrastructure Ltd (EIL)	LPG import terminal	700
Total		**10,986**

1. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW

Exhibit 1.7 | Low, Base and High case scenarios for exports and imports of petroleum products



	Key drivers/ assumptions	Low scenario	Base scenario	High scenario
Key drivers	Domestic consumption (for MS/HSD exports)	~3.5% CAGR growth; low alternate fuels adoption rate	~3% CAGR growth; status quo energy policies	~2.5% CAGR growth till 2030; sustainable energy scenario
	LPG consumption (for imports)	Gradual GDP recovery scenario; slow urbanization and high piped gas penetration	Slow urbanization and low piped gas penetration under PMUY program	Growth GDP renewal; high urbanization and low piped gas penetration
	Refining capacity	~90 MTPA brownfield capacity addition; ~9 MTPA Barmer refinery operationalized	~90 MTPA brownfield capacity; ~15 MTPA from Barmer & Cuddalore refinery	~105 MTPA expansion capacity; ~35 MTPA from Barmer, Cuddalore & Ratnagiri refinery

1. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW

3 Liquified Natural Gas (LNG):

Natural gas in India is either produced domestically (in gaseous form) or imported in liquefied form (liquefied natural gas or LNG). Gas imported in liquid form is gassified at import terminals and then moved internally through pipelines.

Key drivers analysed[9]

LNG consumption demand

- Government policies to improve the gas share from ~6% in 2019 to 15% by 2030. Ban on higher polluting fuels by the Supreme Court of India, and high growth in segments like CGD, LNG for transportation, etc. further expected to drive consumption of LNG (Exhibit 1.8).

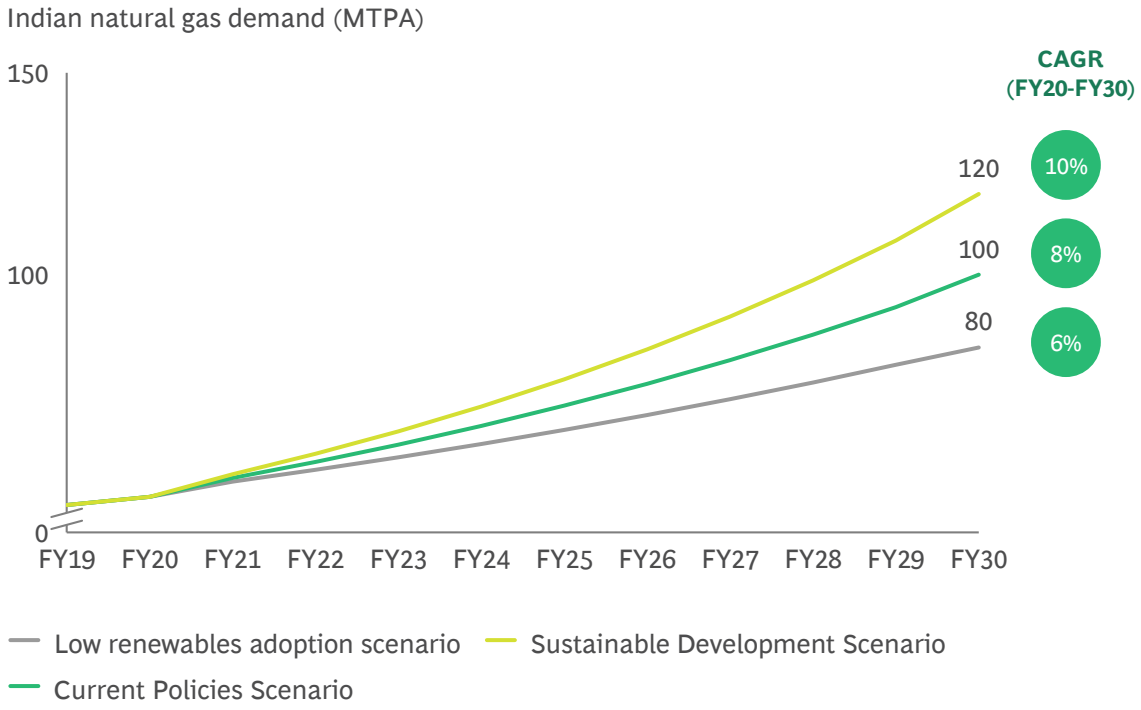
Domestic LNG supply

- Domestic supply of LNG to be led by new ONGC and private sector fields in the eastern offshore (Exhibit 1.8)
- RLNG terminal's capacity planned to increase to ~83 MTPA by 2030
- Boost to supply from new LNG pipeline projects - Cochin LNG terminal to Mangalore and Bangalore and, Dhamra LNG terminal to Kolkata

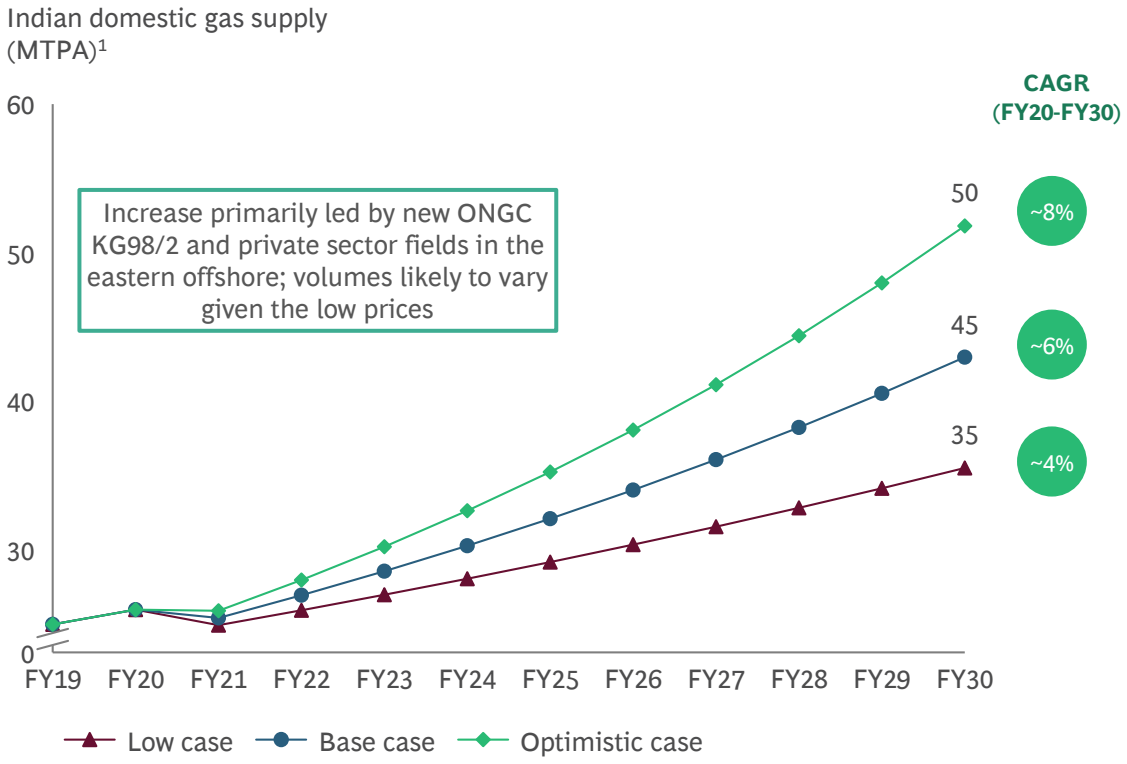
~30 to 80 MTPA LNG imports volume likely by 2030 (Exhibit 1.9).

9 International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW

Exhibit 1.8 | LNG Demand and Supply Forecast till 2030

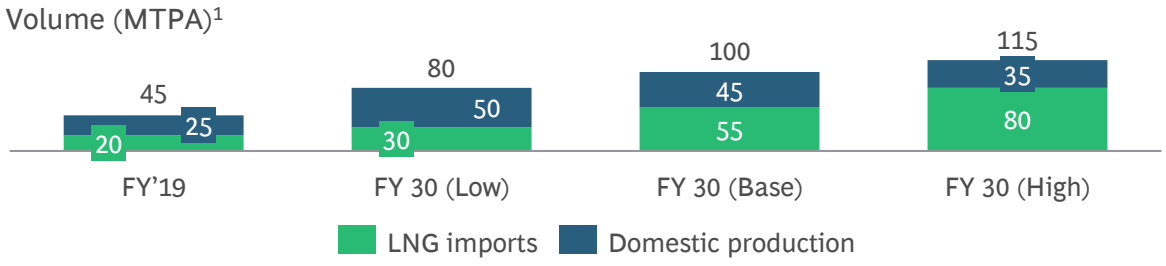


Source: International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW



1. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW

Exhibit 1.9 | Low, Base and High case scenarios for LNG imports



Key drivers

Key drivers/ assumptions	Low scenario	Base scenario	High scenario
Natural gas demand	~6% CAGR growth; led by high fluctuation in global spot prices and low alternate fuels adoption	~8% CAGR growth; similar trend as recent years	~10% CAGR; supported by Govt policies to improve gas share in energy mix
Domestic supply	~8% CAGR growth; eastern offshore fields coupled with low prices	~6% CAGR; supply increase from eastern offshore fields	~4% CAGR; similar trend as recent years

1. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW

In summary, 600-685 MTPA POL traffic is expected by 2030. (Exhibit 01.10)

Exhibit 1.10 | POL Traffic Summary for 2030

FY30 E

All values are in MTPA

S No.	Category	FY 19	Base case[1]	Low / High cases[1]	Key assessment drivers highlights
1	POL category				Bottom-up analysis and growth drivers study undertaken for each sub-category
1.1	Crude oil	225	325	315 / 365	• Crude demand driven by available refining capacity in India: - ~355 MTPA refining capacity expected by 2030 basis industry mapping of brownfield expansions and greenfield projects - Traffic variation likely due to ~60 MTPA new Ratnagiri refinery (land acquisition delays) & ~20 MTPA brownfield projects at risk e.g. Nayara Jamnagar issues due to environmental clearances • Domestic crude supply: - ~30 MTPA supply in base case considering natural decline in field reserves & zero new oil fields (triangulated with PNGRB estimates)
1.2	Petro products (Import, Export)	95 (I-35, E- 60)	130 (I-60, E-70)	105 /190	• Imports e.g. LPG (~40% of total imports) driven by urbanization growth scenarios and respective piped gas penetration rates (10-30%) triangulated with IEA estimates) • Exports e.g. MS/HSD (~70% of total exports) projected basis domestic consumption (~280-315 MTPA) driven by growth of alternate fuels, policy impact as NGT, etc. and increased focus of private players on domestic market
1.3	LNG	20	55	30/80	• NG consumption demand: ~6% to 10% growth expected as a result of fluctuations in global spot prices & policy impact such as Supreme Court Ban on polluting fuels, etc. • Domestic supply: ~4 to 8% growth by new ONGC & reliance fields in eastern offshore
1.4	POL coastal	90	100	–	• ~1% CAGR growth likely; ~80% evacuation from the refineries occurring via established pipeline network due to low cost of transportation (~0.14 to 0.18 INR per ton per Km)
	Total POL	430	610	600/685	

1. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW

1.2.1.2 Coal

~320 MTPA[10] Coal traffic was handled in 2019-20, constituting ~245 MTPA EXIM traffic with ~85% volume by thermal coal imports across ports (Exhibit 1.11)

There are two types of coal used in India- Thermal coal and Coking coal. While Coastal shipping for coal has grown steadily in last few years, there is further potential to grow in next 5-10 years. A bottom-up analysis and an assessment of key growth drivers was undertaken for each sub-category to estimate potential traffic, such as:

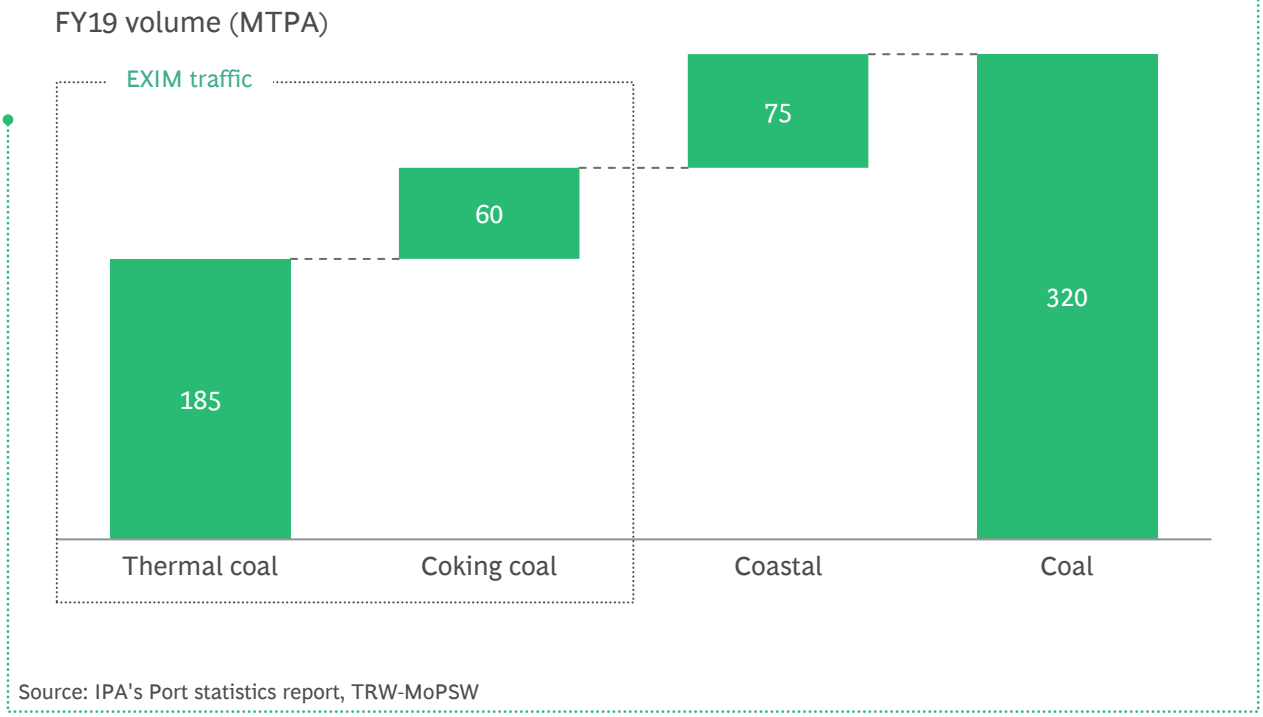
1 Thermal coal:

Key drivers analysed[11]

Domestic consumption	• India coal demand expected to vary in future due to likely increase in demand for renewables / alternate fuels and efficiency improvements in energy consumption (Exhibit 1.12)
Domestic production	• ~The Ministry of Coal has targeted 1.3 Bn tons per annum by 2030, primarily led by ~0.9 to 1 Bn tons per annum coal output from Coal India Limited (CIL) • Government of India is looking to ramp-up commercial block mining to reduce imports' dependence further. Therefore, there is likely potential for an additional surge in domestic coal capacity by ~125 to 225 MTPA (Exhibit 1.13) • E-auction of approximately 41 commercial mining blocks are planned by 2030

~130 to 435 MTPA imports expected by 2030, driven by a change in coal-based energy mix and the addition of new commercial coal blocks (Exhibit 1.14)

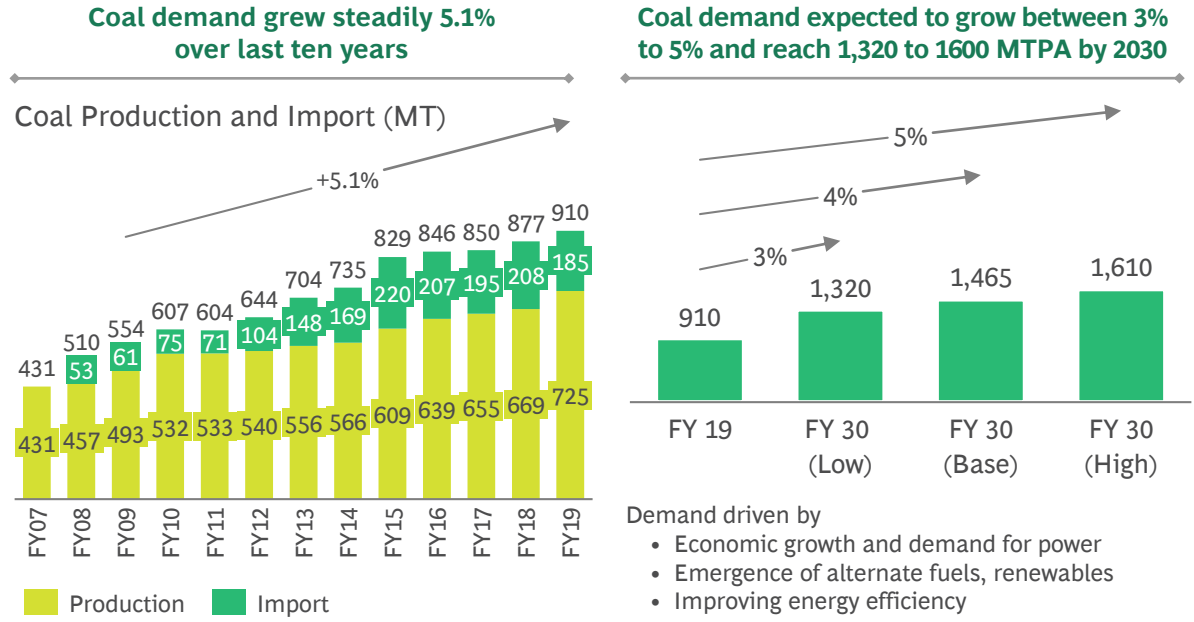
Exhibit 1.11 | EXIM Coal Traffic in FY2019



Source: IPA's Port statistics report, TRW-MoPSW

10 Indian Ports Association (IPA) Statistics report for FY20
11 International Energy Agency, Ministry of Coal, National Electricity Plan, Coal controller statistics, TRW-MoPSW

Exhibit 1.12 | Demand for Coal is expected to grow over the next 10 years

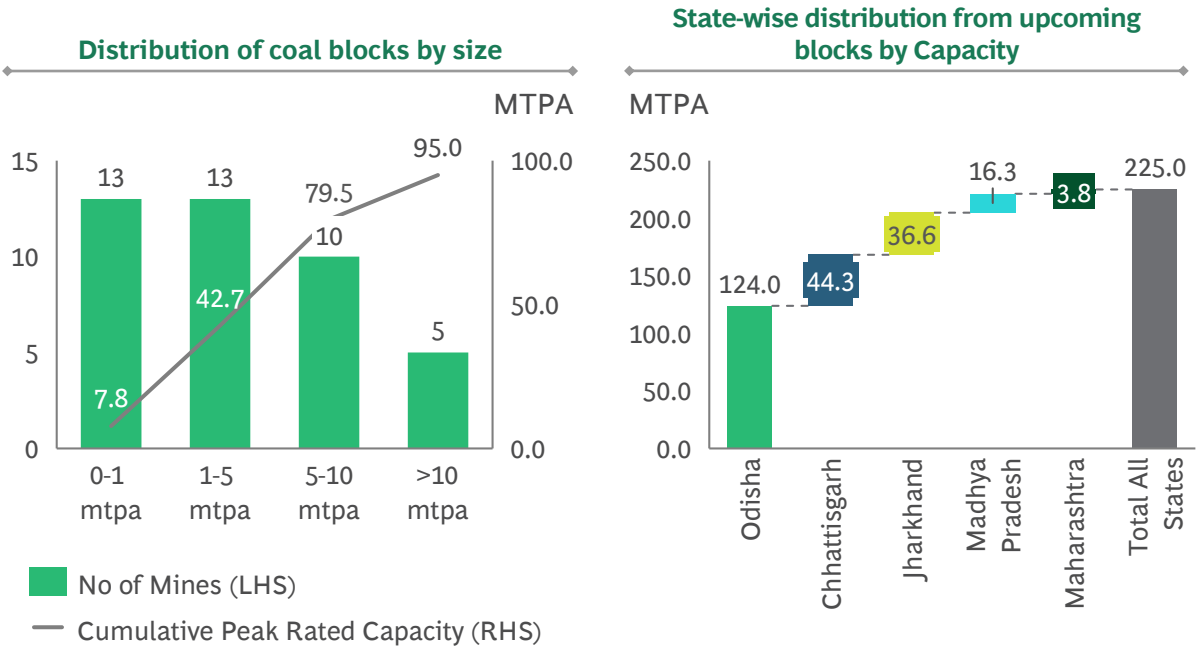


Demand driven by

- Economic growth and demand for power
- Emergence of alternate fuels, renewables
- Improving energy efficiency

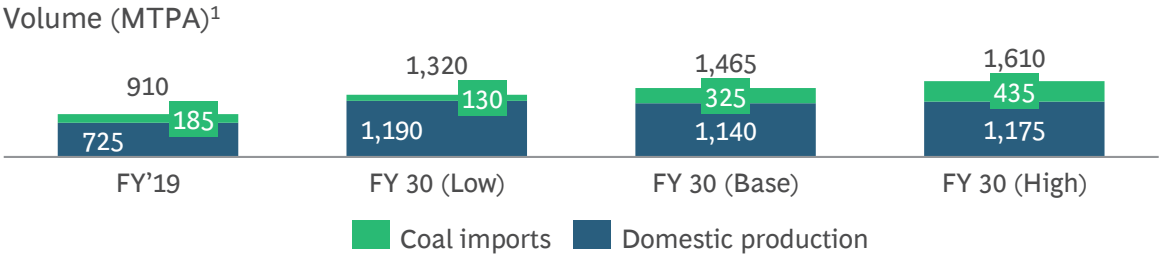
Source: International Energy Agency, Ministry of Coal, National Electricity Plan, Coal controller statistics, TRW-MoPSW

Exhibit 1.13 | Commercial coal blocks auction to reduce imports' dependence



Source: MSTC, CMPDI, PIB, Ministry of Coal, TRW-MoPSW

Exhibit 1.14 | Low, Base and High case scenarios for Thermal coal imports



Key drivers

Key drivers/ assumptions	Low scenario	Base scenario	High scenario
Consumption demand	Energy efficient scenario; RE driving ~50% energy mix	~60% coal-based energy mix; nominal growth in RE adoption	~70% coal-based energy mix (status quo); low RE scale up due to intermittent nature
Domestic production	~0.9 Bn capacity from CIL; ~225 MTPA addition from commercial blocks	~0.9 Bn capacity from CIL; only ~175 MTPA from commercial blocks due to high stripping ratio issues	1 Bn capacity from CIL; only ~125 MTPA from commercial blocks due to auction delays + stripping ratio issues

1. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: International Energy Agency, Ministry of Petroleum & Natural Gas, Petroleum Planning and Analysis Cell (PPAC), TRW-MoPSW

2 Coking coal:

Key drivers analysed[12]

Domestic steel production (coal demand)

- As per the National Steel Policy and steel industry experts, the total domestic steel throughput is expected to reach ~255 MTPA by 2030 (Exhibit 1.19)
- ~60-80% of steel production is likely to be based on Blast Furnace operations, which will further drive the demand of coking coal by ~105 to 140 MTPA by 2030

Domestic coal supply

- ~10 to 20 MTPA of coal capacity addition is expected by 2030 through Government of India's push to improve ash content (from 25-30% to 10-14%) through operationalisation of coal washeries as required by domestic steel plants

~70 to 115 MTPA imports expected by 2030, driven by variation in coal-based steel operations and washeries completion (Exhibit 1.15)

12 International Energy Agency, Ministry of Coal, National Electricity Plan, Coal controller statistics, TRW-MoPSW

3 Coal Coastal Shipping:

The Indian Railways are the primary transporter of coal in the country, and the current mine-power plant linkages have been designed to optimize railway-based transportation costs. Coastal shipping opportunities for thermal power plants primarily depend on the following criteria –

- Geographic location – Plants located in coastal states – Gujarat, Maharashtra, Karnataka, Goa, Kerala, Tamil Nadu, and Andhra Pradesh
- Type of coal used – Power plants using domestic/blended coal or imported coal are relevant for potential coastal evaluation. Lignite-based power plants are not relevant as they are located at the pit head, and there is limited scope for coastal movement

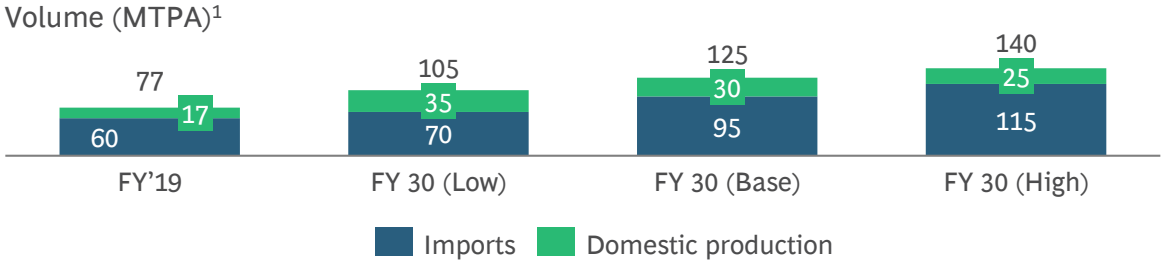
Key enablers to support coastal shipping for coal are as follows –

1. Eastern port cluster, comprising of ports at Paradip, Dhamra, etc.to ramp up their coal export (mechanized) capacity to 100-120 MTPA[13] by 2030
2. The capacity for coal movement from MCL coal mines in Ib valley/Talcher to the Eastern cluster ports to be ramped up to ~55-65 rakes[13] per day by 2030.
3. Differential pricing structure is required for coastal cargo to improve cost economics and reduce costs related to 2-leg rail/rake transportation

In total, ~100 to 130 MTPA coal (Exhibit 1.16) can be moved through the coastal mode by 2030 with existing thermal power plants running at 70-80% Plant Load Factor (PLF) and upcoming plants in Gujarat and Maharashtra running at 50% PLF.

In summary, ~310–695 MTPA Coal traffic is expected by 2030 across scenarios (Exhibit 1.17)

Exhibit 1.15 | Low, Base and High case scenarios for Coking Coal Imports

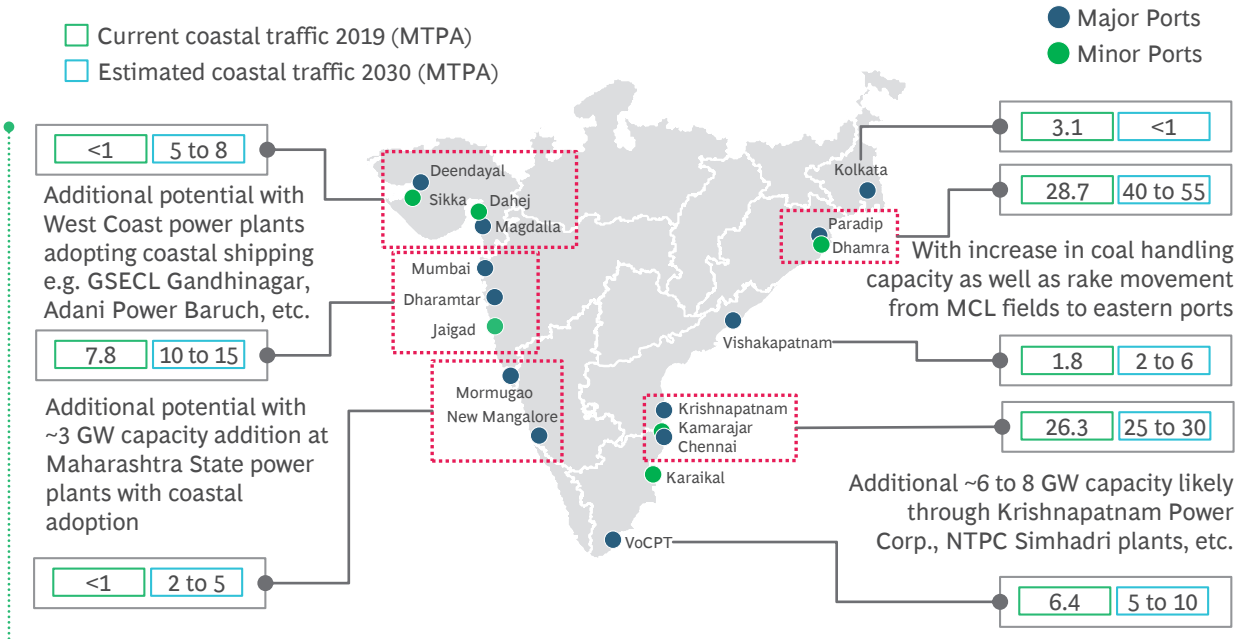


	Key drivers/ assumptions	Low scenario	Base scenario	High scenario
Key drivers	Consumption demand	~60% of steel production driven by Blast Furnace operations	~70% of steel production driven by Blast Furnace operations	~80% of steel production driven by Blast Furnace operations
	Coal washeries operations (for domestic production)	~17 MTPA additional washeries capacity; aided by push from Govt. to reduce imports	~12 MTPA additional washeries capacity; 3 washeries operationalization delayed	~7 MTPA additional washeries capacity; 4 washeries operationalization delayed

1. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: International Energy Agency, Ministry of Coal, National Electricity Plan, Coal controller statistics, SteelMint, Expert discussions, TRW-MoPSW

13 Ministry of Coal, Expert discussions, TRW-MoPSW; Detailed technical feasibility study to be done in collaboration with Ministry of Railways (MoR)

Exhibit 1.16 | 100 to 130 MTPA coastal shipping potential for coal



Source: Ministry of Coal, Expert discussions, TRW-MoPSW
Note: < 1 refers to limited traffic (for both current and 2030 traffic)

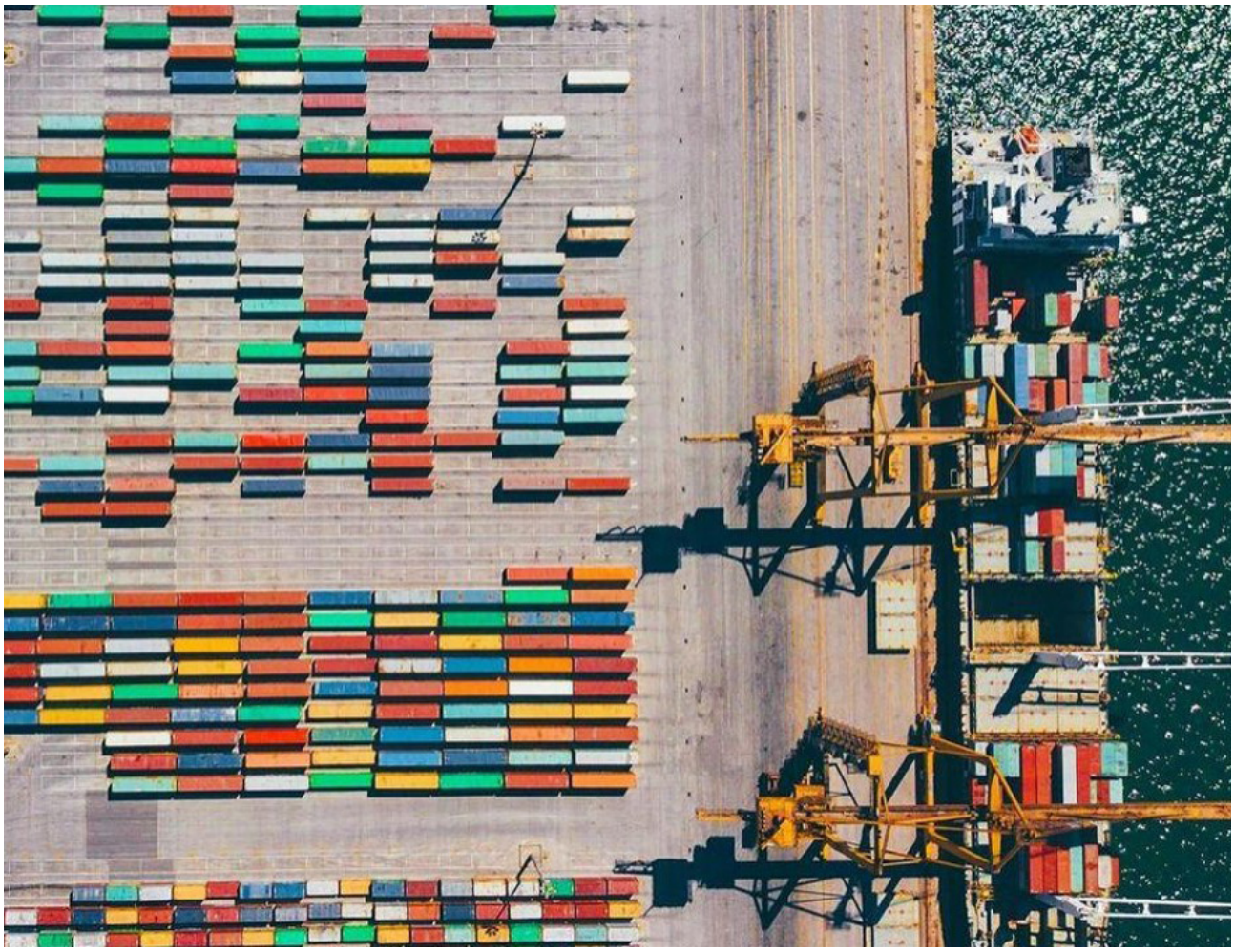


Exhibit 1.17 | Coal Traffic Summary for 2030

FY30 E

All values are in MTPA

S No.	Category	FY 19	Base case[1]	Low / High cases[1]	Key assessment drivers highlights
2	Coal category				Bottom-up analysis and growth drivers study undertaken for each sub-category
2.1	Thermal coal	185	325	130/435	• Domestic consumption: ~55-70% energy contribution i.e. 1320 to 1610 MTPA thermal coal demand for power plants by 2030 (triangulated with CEA projections) • Domestic production: ~0.9-1 Bn tons expected from CIL by 2030; e-auctions of commercial blocks driving ~125 to 225 MTPA capacity potential • Upcoming thermal plant: 6-8 GW in AP cluster by NTPC Simhadri and Krishnapatnam Power Corp
2.2	Coking coal	60	95	70 /115	• Demand driven by steel production: ~255 MTPA steel capacity expected by 2030 basis industry mapping brownfield expansions and greenfield projects; ~60-80% steel to be driven by coking coal-based Blast Furnace operations • Domestic coal washeries: ~20-60% washeries operationalization estimated basis current projects status and GoI push for the same to reduce imports
2.3	Coal coastal shipping	75	110	100/130	• Region-wise upcoming thermal capacity mapped for potential increase in coastal shipping across clusters • To unlock additional ~20 MTPA coastal potential, key enablers identified like adding rakes capacity in Eastern cluster, cost reduction for 2-leg rake transport, etc.
	Total Coal	320	530	300/680	

1. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: International Energy Agency, Ministry of Coal, National Electricity Plan, Coal controller statistics, SteelMint, Expert discussions, TRW-MoPSW

1.2.1.3 Iron Ore

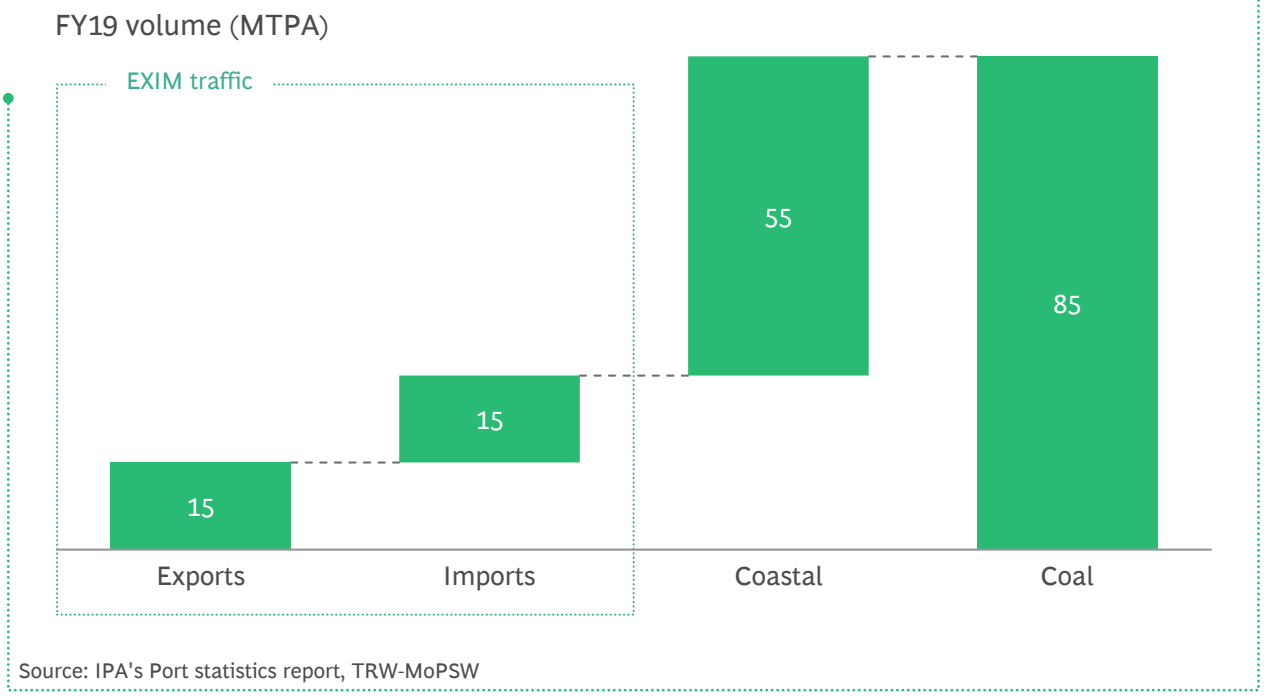
Iron ore production in India in 2019 crossed 231 MTPA[14] with a growth of 12.9% as compared to 204.7 MTPA in 2018. Indian ports handled about 85 MTPA[15] of iron ore traffic in 2019, constituting ~55 MTPA coastal traffic movement across ports (Exhibit 1.18)

India's steel output, as envisaged by the National Steel Policy, is expected to reach 255 MTPA by FY2030, thus leading to ~430 MTPA consumption demand for iron ore (Exhibit 1.19). With most of the major steel manufacturers in India such securing iron ore mines in the Eastern hinterland, iron ore/pellets exports are likely to decrease in the next decade. Historically, exports of iron ore/pellets have decreased with approx. 11.3% CAGR in the last 10 years[15]. In addition, export and import tariff duties on high-grade iron ore further limits the EXIM potential, unless tariff relaxation is allowed in the long term. For low grade iron ore, there exists a 2-5% CAGR export growth potential[16]. This leads to 20 to 35 MTPA[17] EXIM traffic volume for iron ore by 2030, led by low grade iron ore exports and relaxation in tariffs in the long term (Exhibit 1.20).

India's geographical analysis shows further potential to foster iron ore coastal movement from East to West (Exhibit 1.21). A bottom-up analysis for regional cluster-wise current and upcoming steel capacity provides potential for increase in coastal shipping for iron ore across clusters (Exhibit 1.23). Hence, ~100 to 110 MTPA[17] coastal movement of iron ore can be expected by 2030, primarily driven by increase in steel/pellet production in Maharashtra, Karnataka, and Gujarat and new iron ore blocks operationalizing in Eastern cluster.

In overall, ~120-145 MTPA iron ore traffic is expected by 2030 (Exhibit 1.22)

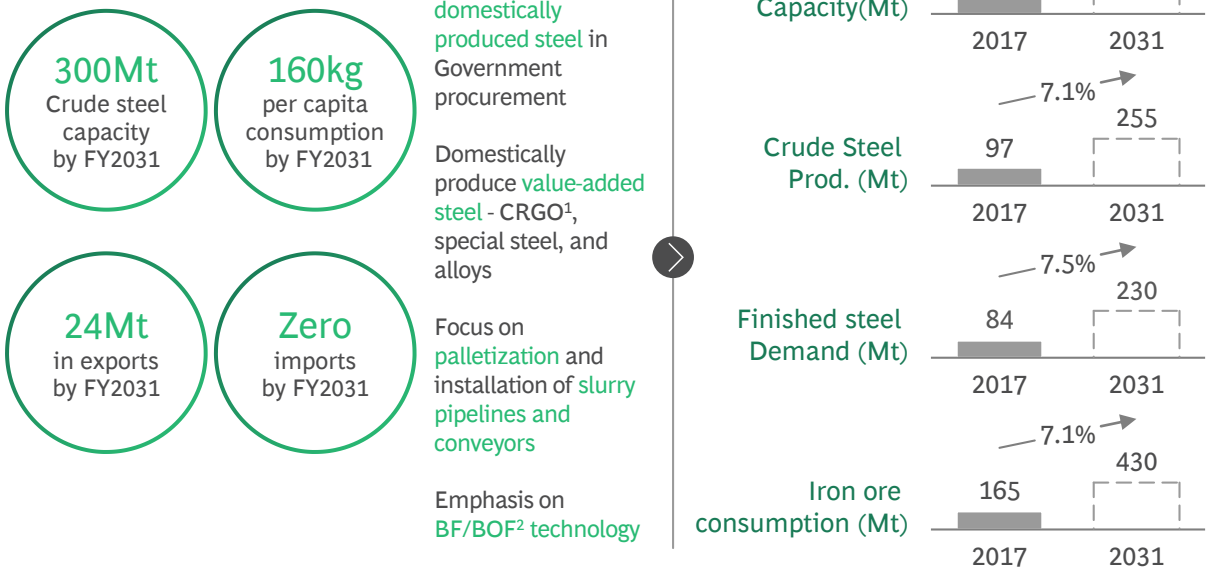
Exhibit 1.18 | EXIM Traffic for Iron Ore in FY2019



Source: IPA's Port statistics report, TRW-MoPSW

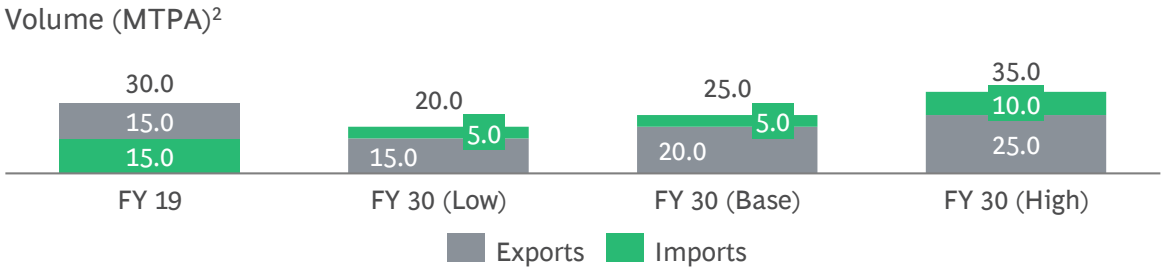
14 Ministry of Steel Annual Report FY20
15 Indian Ports Association (IPA) Statistics Reports
16 Ministry of Steel, SteelMint, Expert discussions, TRW-MoPSW
17 Indian Ports Association (IPA) Statistics Reports

Exhibit 1.19 | Key Elements of the National Steel Policy 2017



1. Cold-rolled grain-oriented 2. Blast Furnace/Basic Oxygen Furnace
Source: Ministry of Steel; National Steel Policy (2017)

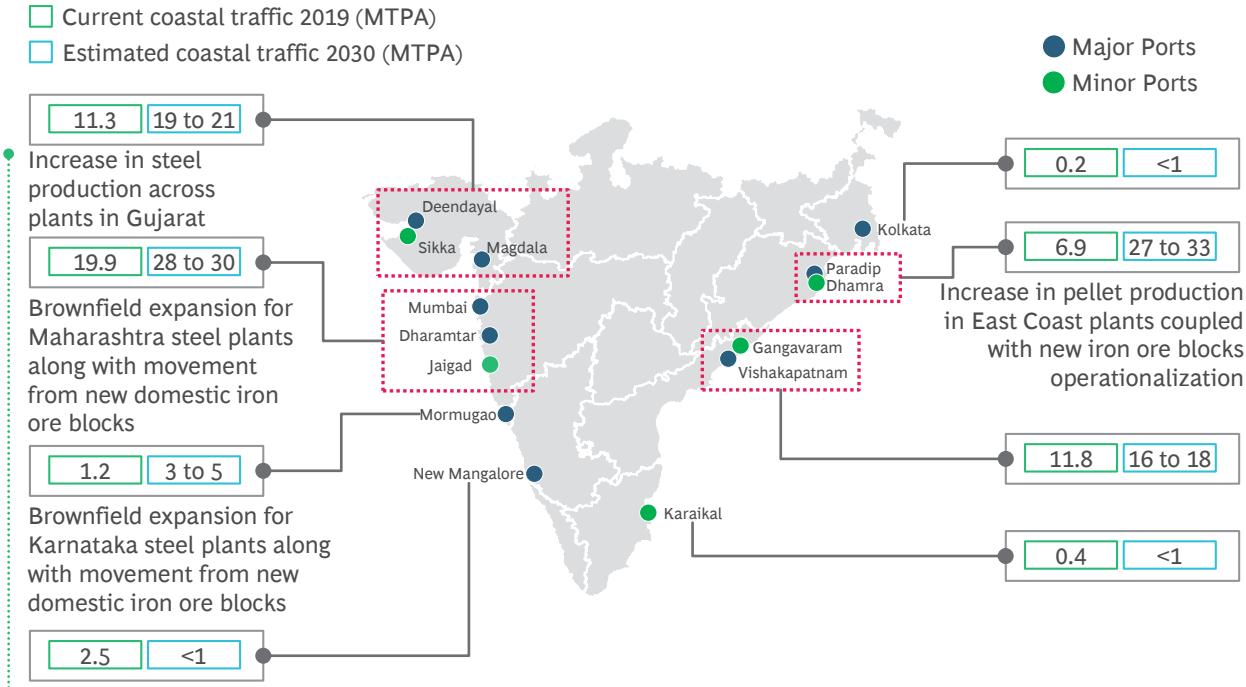
Exhibit 1.20 | Low, Base and High case scenarios for Iron ore exports/imports



Key drivers/ assumptions	Low scenario	Base scenario	High scenario
Import demand	All major steel companies have secured captive iron ore mines; coupled with large price spread between Indian and global markets (~30$/t diff.)		
Export tariffs (Key driver)	Similar trend to continue in low grade iron exports; tariffs continue as in current times	Similar exports tariffs; ~3% CAGR growth in low grade iron demand e.g. from China	Relaxation in tariffs to dive exports; ~3% CAGR growth in low grade iron demand

1. <58% Fe content
2. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: Ministry of Steel, National Steel Policy (2017), SteelMint, Expert discussions, TRW-MoPSW

Exhibit 1.21 | 100 to 110 MTPA coastal shipping potential for Iron ore



Source: Ministry of Steel, National Steel Policy (2017), SteelMint, Expert discussions, TRW-MoPSW
Note: < 1 refers to limited traffic (for both current and 2030 traffic)

Exhibit 1.22 | Iron Ore Traffic Summary for 2030

FY30 E

All values are in MTPA

S No.	Category	FY 19	Base case	Low/Best cases	Key reasons
3	Iron ore category				Bottom-up analysis and growth drivers study undertaken for each sub-category
3.1	Iron ore – EXIM	30	25	20/35	• All major steel companies have secured captive iron ore mines • Export and import tariffs on high-grade Iron Ore limiting EXIM volume • ~2-5% CAGR growth likely in low grade iron demand e.g. from China
3.2	Iron ore – Coastal	55	105	100 /110	• Coastal movement constituting ~65-70% of total traffic movement • Region-wise current and upcoming steel capacity mapped for potential increase in coastal shipping across clusters • To achieve additional ~10-15 MTPA coastal potential, key enablers such as additional handling capacity at Dharamtar & Jaigad port, etc.
	Total Iron ore	85	130	120/145	

Source: Ministry of Steel, National Steel Policy (2017), SteelMint, Expert discussions, TRW-MoPSW

1.2.1.4 Containers

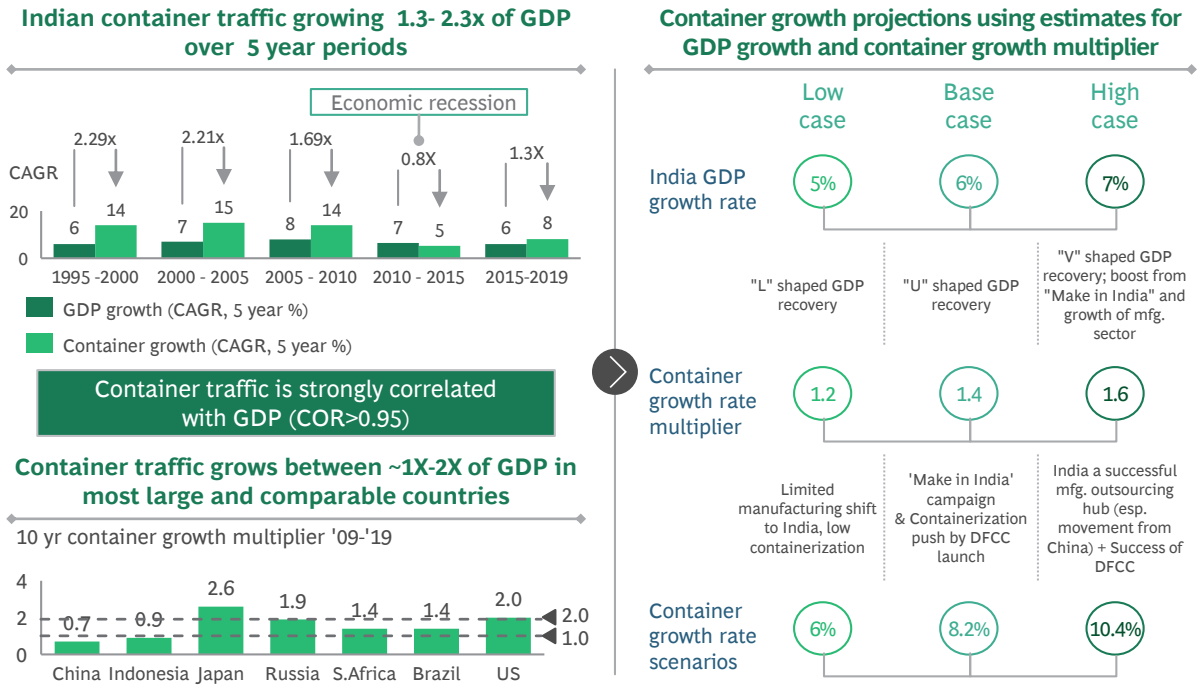
Since the mid-80s, structural changes in India's trade policies and the maritime transport sector developments have brought high growth for containerization. As a result, the share of containerized traffic in general cargo has increased significantly. In 2019, the total throughput of Indian container terminals reached approximately 16 Mn TEUs[17], with ports on the West Coast dominating the container infrastructure and throughput in India. More than 70% of the country's containers are handled at the West Coast ports[18].

While India currently is at less than 30% containerization levels, other developing and developed nations have reached more than 65% containerization levels[18]. Containerization in India is set to increase in next 5-10 years with growth in infrastructure (Ports, highways, and railways), improved multi-modal transportation, and cost efficiency.

Three different scenarios (Low case, Base case, and High case) (Exhibit 1.23) were forecast basis key drivers such as varying GDP recovery scenarios, manufacturing growth potential in India, and the success of DFCC to push containerization etc. Overall, in India, container traffic is expected to witness 6% to 10% growth to reach 410 to 620 MTPA[18] by 2030 (Exhibit 1.24).

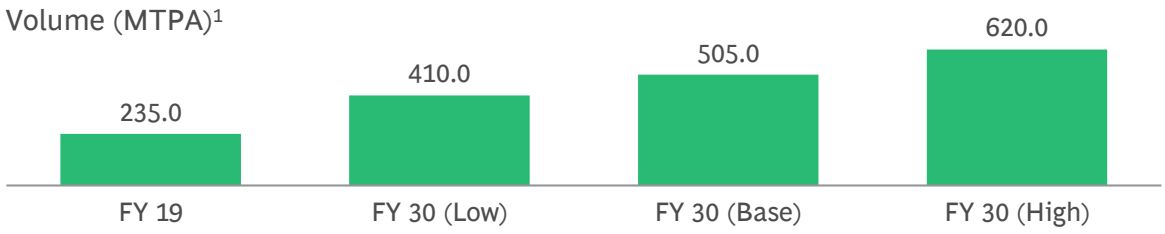
18 IHS Global Trade flows, EIU data, Expert discussions, TRW-MoPSW
19 Ministry of Commerce, Cement Information System (CIS), Expert discussions, TRW-MoPSW

Exhibit 1.23 | Indian Container Traffic and Growth Projections



Source: IHS Global Trade flows, EIU data, Expert discussions, TRW-MoPSW

Exhibit 1.24 | Low, Base and High case scenarios for Containers



	Key drivers/ assumptions	Low scenario	Base scenario	High scenario
Key drivers	India GDP growth rate	"L" shaped GDP recovery	"U" shaped GDP recovery	"V" shaped GDP recovery; boost from "Make in India" and growth of manufacturing sector
	Container growth rate multiplier	Limited manufacturing shift to India, low containerization	Push to 'Make in India' & Containerization push by DFCC launch	India to become successful manufacturing outsourcing hub; success of DFCC to push containerization

1. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: IHS Global Trade flows, EIU data, Expert discussions, TRW-MoPSW

1.2.1.5 Other commodities (Coastal shipping)

1 Cement:

Cement is a highly cost-sensitive commodity with production clusters distributed across India from where they serve nearby regions. Around 65% of the bulk and bagged cement[20] in the country is transported using the road network which is also the cheapest transport mode until ~200 km. The remaining cement is transported by rail, most optimal over longer lead distances i.e. from 200 km to 1400 km. (Exhibit 1.25).

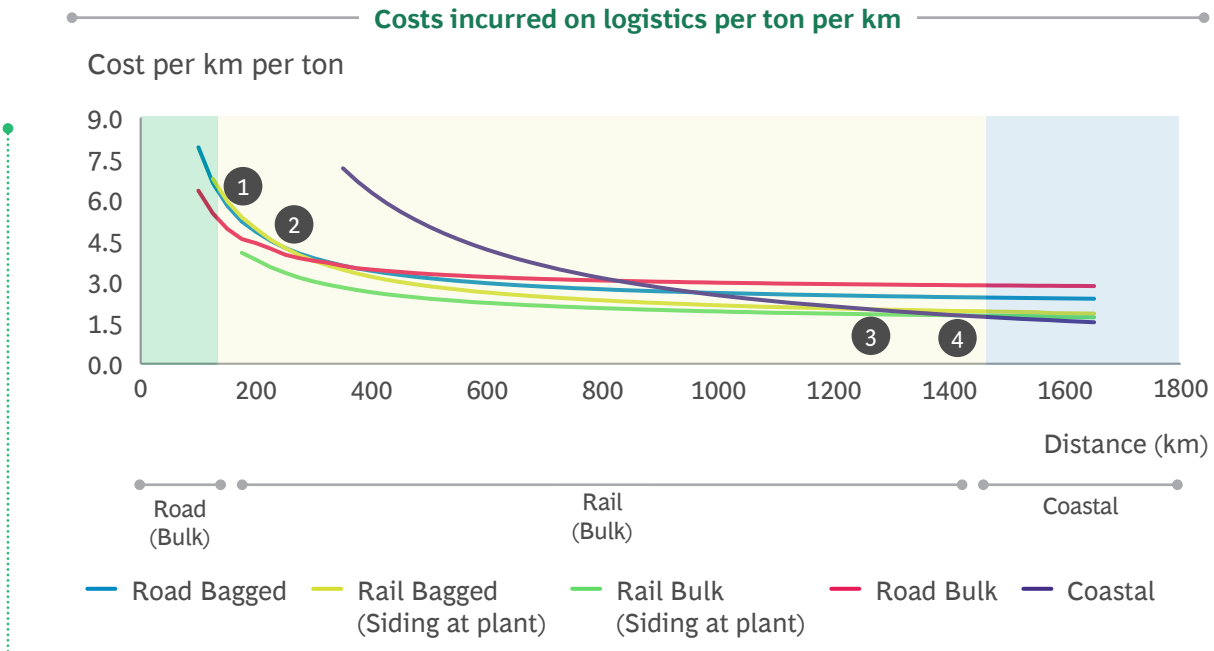
Only about ~2% of the cement[20] is transported using coastal shipping, which remains the most viable mode to transport cement beyond 1300-1400 km. The coastal movement is primarily limited to two large players who have captive loading jetties in Gujarat with silo infrastructure to optimize costs through bulk movement. In the next decade, South India is likely to continue as the largest region for cement consumption, while Central & Eastern regions are expected to grow the fastest, aided by robust public spending for social and physical infrastructure development (Exhibit 1.26).

Total cement capacity is expected to grow at 3.5 – 4.5% CAGR to 85-100 MTPA[20] by 2030 across 12 supply clusters (based on the location of manufacturing units) (Exhibit 1.27). In addition to the existing coastal movement routes, the long haul rail movement from production clusters located in coastal districts of Andhra Pradesh, Telangana and Tamil Nadu to coastal consumption regions of Maharashtra, Kerala, Odisha and West Bengal also has the potential to shift to the coastal mode. In summary, 13 to 18 MTPA coastal movement potential exists for cement by 2030 (Exhibit 1.28).

2 Steel

India's overall steel production is ~100 MTPA[21] with seven large players (SAIL, TATA, JSPL, RINL, ESSAR, JSW, and Bhushan steel) contributing ~60% of the total production. Major long-haul movement of steel is between the steel production clusters in Eastern India to Western and Northern India's

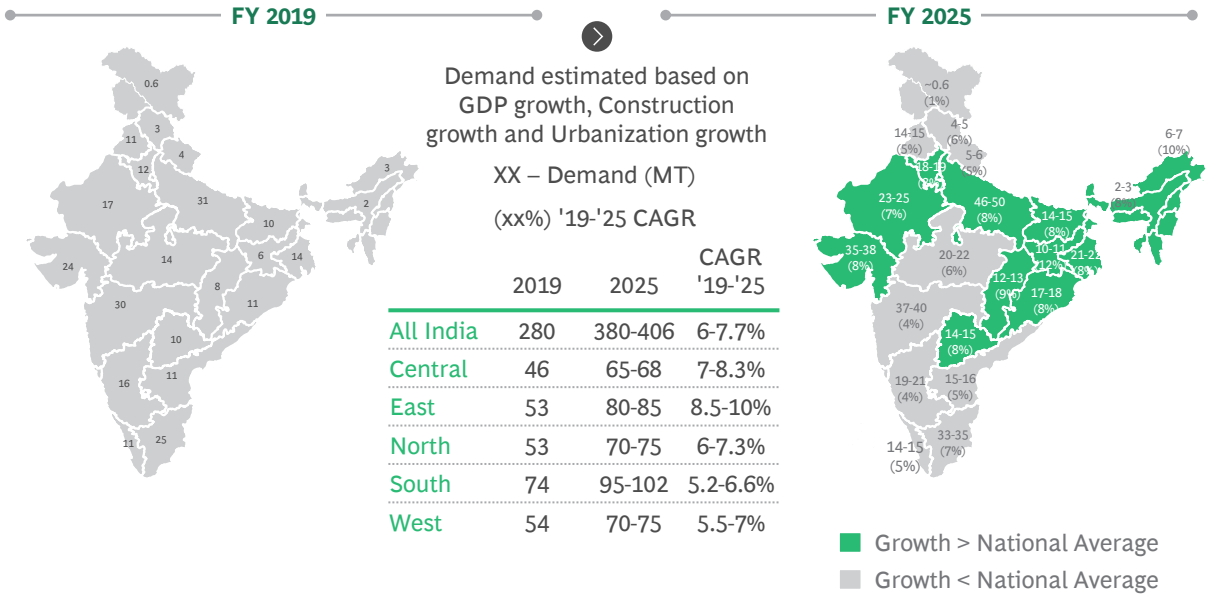
Exhibit 1.25 | Transporting Cement by coastal means is cheapest over 1300 Kms



1. Only rail mode where a siding is present at the plant is considered
Source: Ministry of Commerce, Cement Information System (CIS), Expert discussions, TRW-MoPSW

20 Ministry of Commerce, Cement Information System (CIS), Expert discussions, TRW-MoPSW

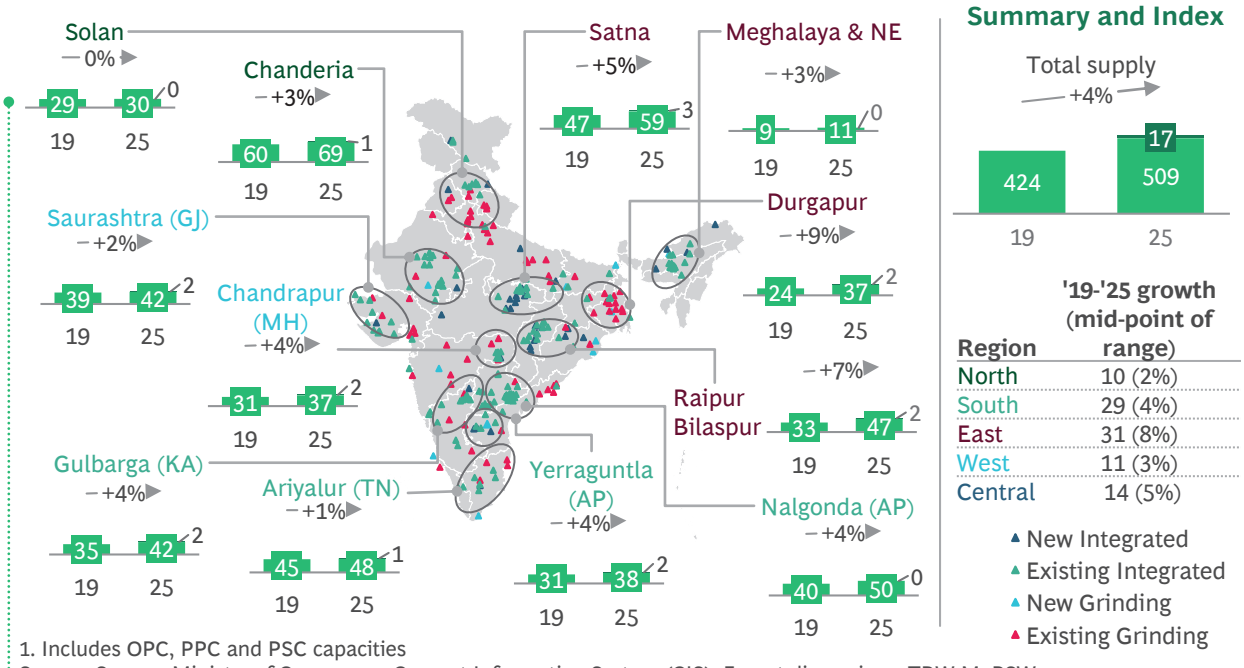
Exhibit 1.26 | South India to lead cement consumption followed by Central and Eastern Regions



	2019	2025	CAGR '19-'25
All India	280	380-406	6-7.7%
Central	46	65-68	7-8.3%
East	53	80-85	8.5-10%
North	53	70-75	6-7.3%
South	74	95-102	5.2-6.6%
West	54	70-75	5.5-7%

Source: Ministry of Commerce, Cement Information System (CIS), Expert discussions, TRW-MoPSW

Exhibit 1.27 | Cement Capacity to grow at 3.5 – 4.5% CAGR across India



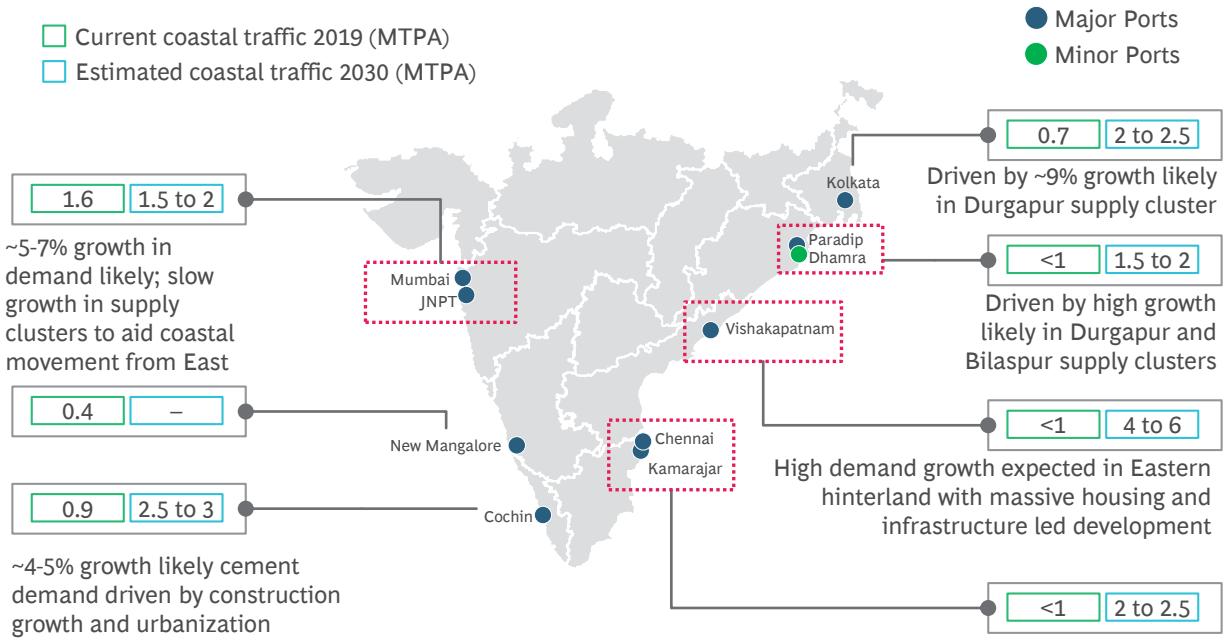
Summary and Index

Region	'19-'25 growth (mid-point of range)
North	10 (2%)
South	29 (4%)
East	31 (8%)
West	11 (3%)
Central	14 (5%)

▲ New Integrated
▲ Existing Integrated
▲ New Grinding
▲ Existing Grinding

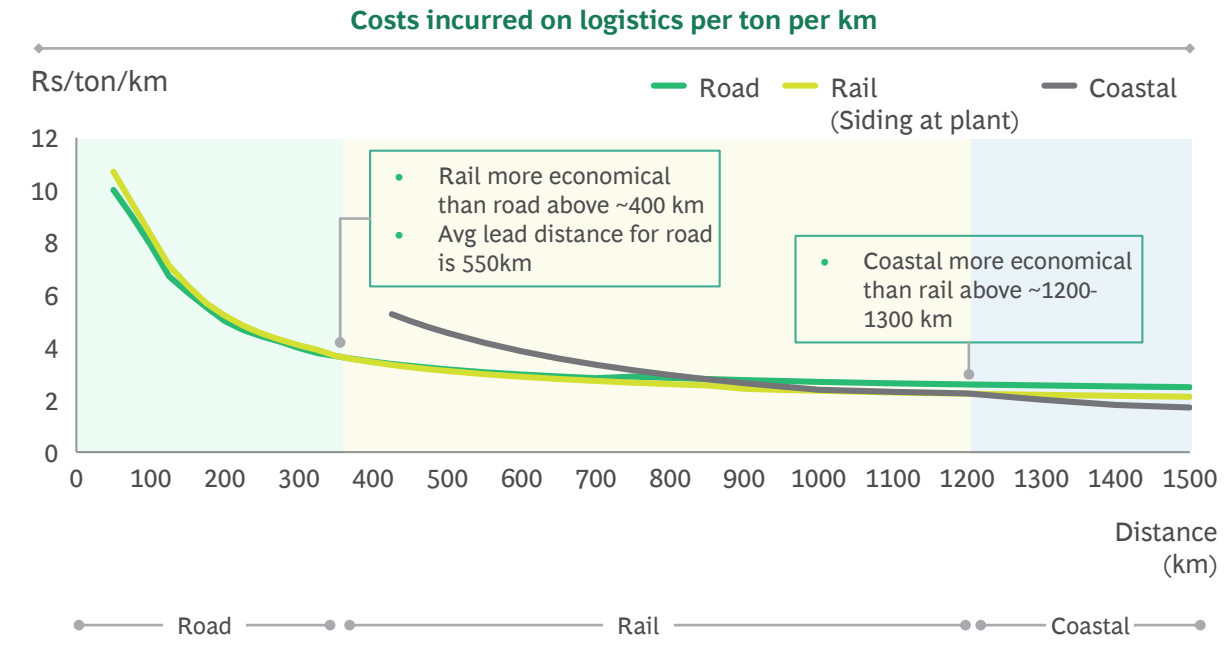
1. Includes OPC, PPC and PSC capacities
Source: Source: Ministry of Commerce, Cement Information System (CIS), Expert discussions, TRW-MoPSW

Exhibit 1.28 | 13 to 18 MTPA coastal movement potential for cement



Source: Ministry of Commerce, Cement Information System (CIS), Expert discussions, TRW-MoPSW
Note: < 1 refers to limited traffic (for both current and 2030 traffic)

Exhibit 1.29 | Coastal movement for steel becomes viable over 1200 kms

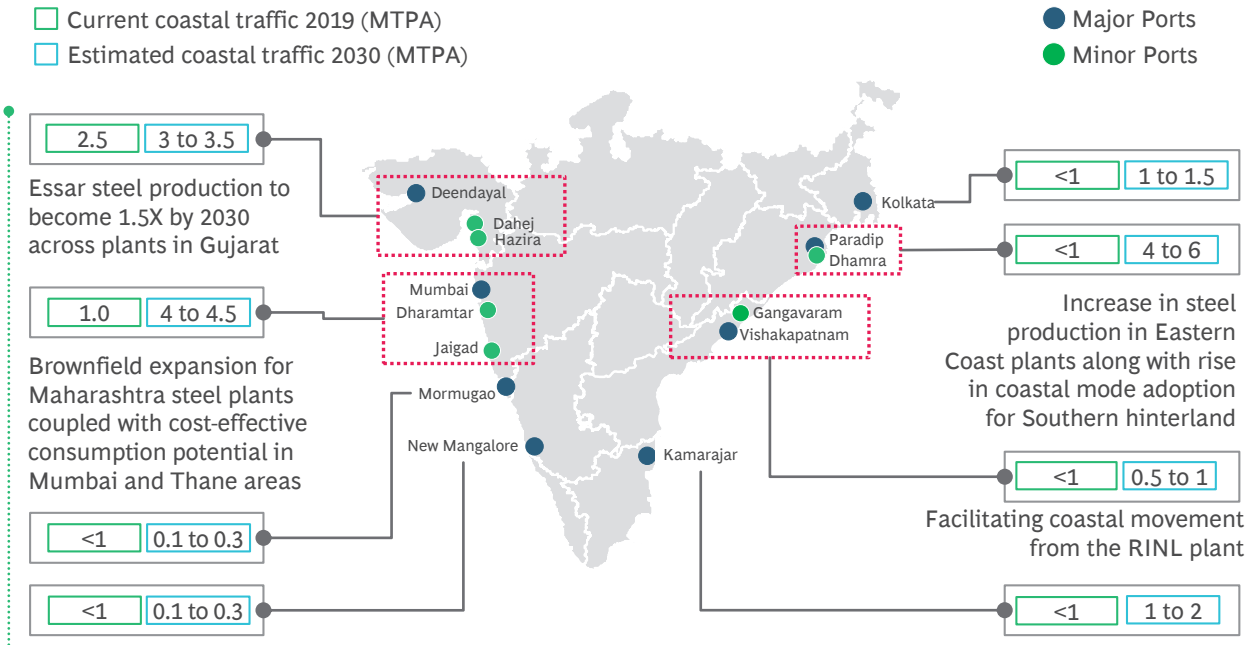


Source: Ministry of Steel, National Steel Policy (2017), SteelMint, Expert discussions, TRW-MoPSW

auto and capital goods production clusters, major cities, and infrastructure project sites. Railways are the most optimal mode of transport for the long-haul distribution of steel products, even for the markets situated near the coast such as Mumbai and Ahmedabad. On the other hand, road transport for steel becomes marginally optimal for short-haul distribution i.e., below 400 km. With coastal shipping becoming a viable option only beyond 1200 km, the current movement is primarily restricted to movement from plants in Hazira to consumption centers of Maharashtra, Karnataka, and Kerala (Exhibit 1.29).

The overall modal share for the steel industry (finished products) is thus skewed towards rail and road, indicating a potential to create multimodal solutions to enable a shift to the coastal mode. A further deep-dive into district-wise movement indicates that 14 to 20 MTPA[21] steel movement can be potentially shifted to the coastal mode by 2030 (Exhibit 1.30).

Exhibit 1.30 | 14 to 20 MTPA coastal movement potential for Steel



Source: Ministry of Commerce, Cement Information System (CIS), Expert discussions, TRW-MoPSW
Note: < 1 refers to limited traffic (for both current and 2030 traffic)

3 Fertilizers

India is the 3rd largest fertilizer producer globally, with ~90% production[22] constituting urea or complex fertilizers. Around 65% of production comes from coastal plants while the rest is produced along the natural gas pipeline in the hinterlands of Madhya Pradesh, Rajasthan, Punjab, etc. Imports are majorly handled at Deendayal Port (~21%), Mundra (23%), Kakinada (12%), Gangavaram (8%), and Vishakhapatnam (8.5%). Rail has been the primary mode of transport for long-distance movement of fertilizer, even for movement between coastal plants and coastal consumption centers. However, to promote coastal shipping, the government has taken some policy initiatives in the last two years:

- Extending Nutrient Based Subsidy (NBS) policy for P and K fertilizers and UFS policy for urea to coastal and inland waterways. For coastal/inland water movement, the subsidy provided is equal to notional railway freight from plant/port up to the nearest railhead of delivery points

21 Ministry of Steel, National Steel Policy (2017), SteelMint, Expert discussions, TRW-MoPSW
22 Ministry of Chemicals and Fertilizers, Expert discussions, TRW-MoPSW

Relaxation of cabotage rule for foreign flag vessels allowing them to engage in coastal trade of India for the carriage of fertilizers by sea; subject to the quantity of trade of fertilizers contributing to at least 50% of the total cargo on-board the ship

The following additional key action items need to be undertaken to support coastal shipping for fertilizers –

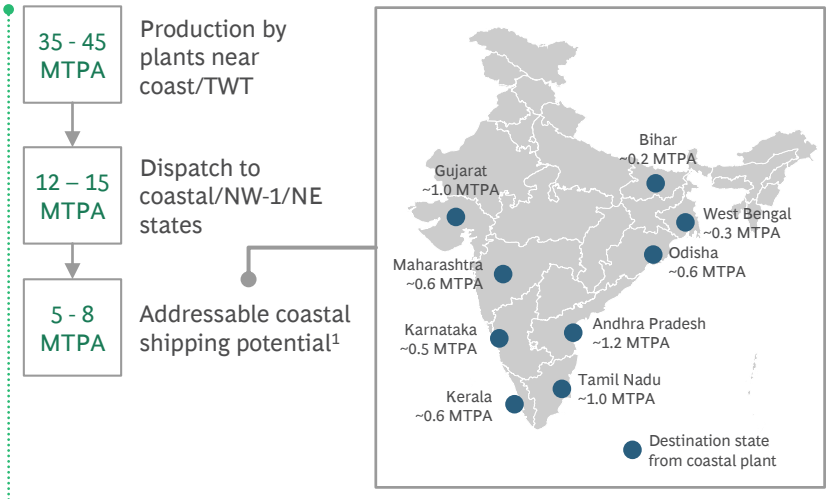
1. Using smaller vessels (barges) directly to a berth/jetty closer to consumption centers
2. Fast-tracking of reimbursement mechanism for coastal shipping in the online system
3. Representation to GST council on inverted duty structure to ensure that owner is unable to claim complete input credit due to higher input taxes

A deep-dive into the district-wise movement indicates that 5 to 8 MTPA[23] of rail movement can be potentially shifted to the coastal movement for fertilizers (Exhibit 1.31). Odisha, Gujarat, and Tamil Nadu are the key originating states, while the consumption is spread across the coastal districts evenly, with Andhra Pradesh as the highest consumption state (Exhibit 1.32).

In summary, Total cargo traffic has been estimated in the range of ~1.8 to ~2.6 Bn ton per annum across 3 scenarios (low case, base case, and high case) (Exhibit 1.33).

Exhibit 1.31 | Increased potential for coastal movement for fertilizers

Illustration: Potential coastal movement across coastal districts (Base case scenario)

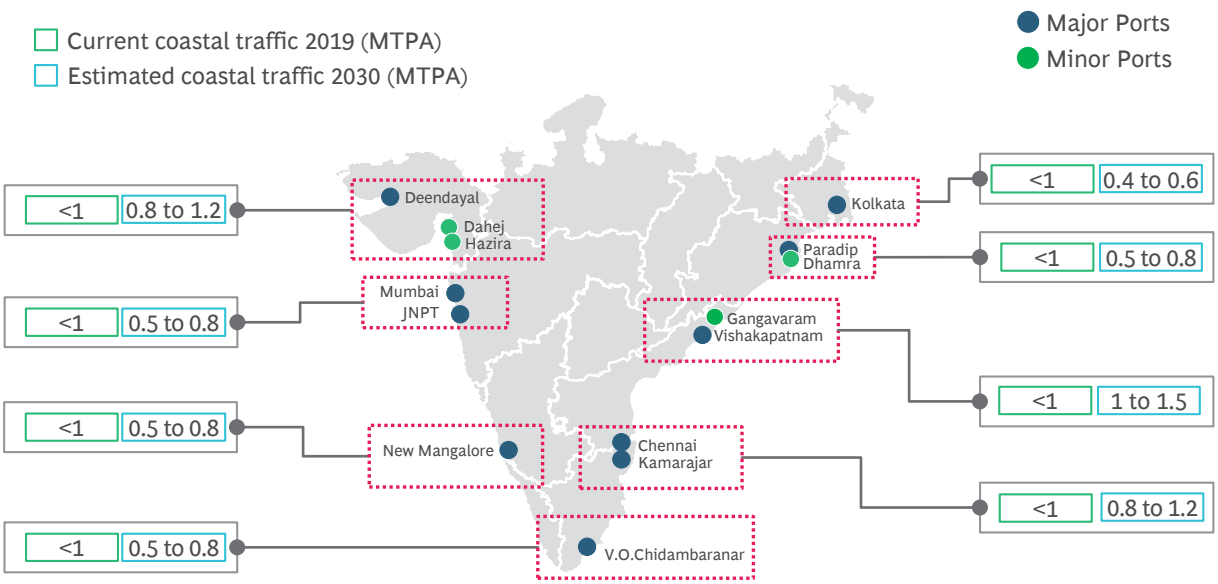


Key O-D Pairs	Potential (MTPA)
Tamil Nadu-Andhra Pradesh	~0.4
Andhra Pradesh – West Bengal	~0.2
Gujarat – Andhra Pradesh	~0.4
Odisha – Bihar	~0.2
Tamil Nadu – Karnataka	~0.4
Gujarat – Maharashtra	~0.4
Andhra Pradesh – Odisha	~0.3
Kerala – Tamil Nadu	~0.3
Odisha – Andhra Pradesh	~0.2
Andhra Pradesh – Tamil Nadu	~0.4
Maharashtra to Gujarat	~0.4
Others	~2.4
Total	**~6.0**

1. Potential includes movement to districts within 200 km of coast/100 km of NW-1
Source: Ministry of Chemicals and Fertilizers, Discussion with Port teams, ADB report, Expert discussions, TRW-MoPSW

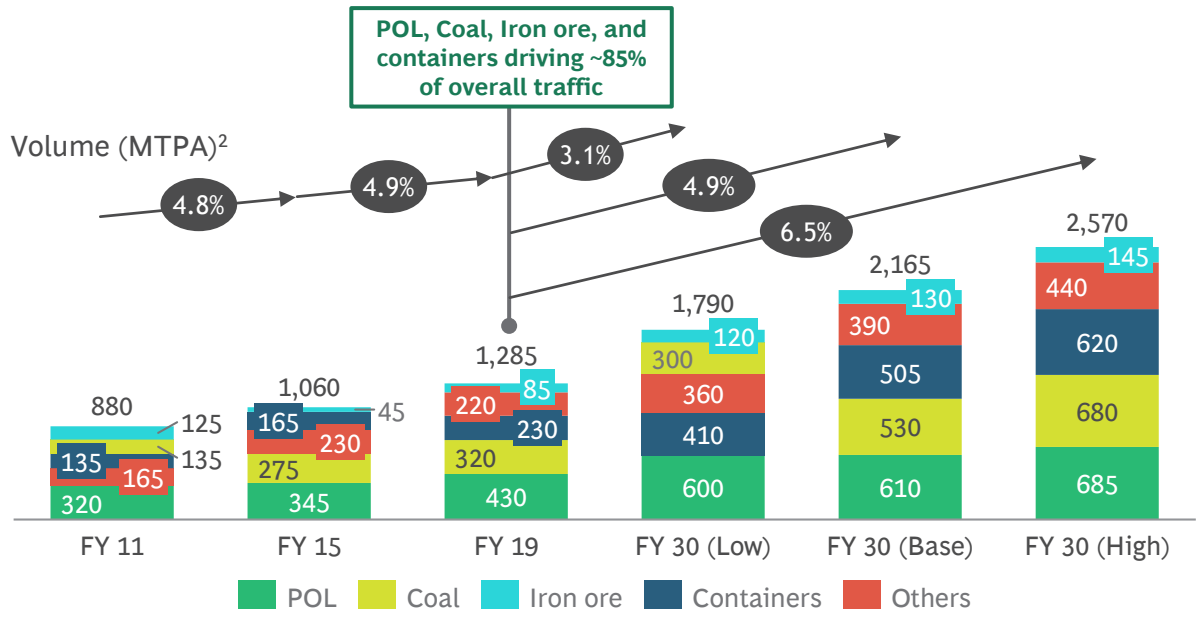
23 Ministry of Chemicals and Fertilizers, Expert discussions, TRW-MoPSW

Exhibit 1.32 | 5 to 8 MTPA coastal movement potential for fertilizers



Source: Ministry of Chemicals and Fertilizers, Expert discussions, ADB report, TRW-MoPSW
Note: < 1 refers to limited traffic (for both current and 2030 traffic)

Exhibit 1.33 | 2030 Traffic Projections across 3 scenarios (low case, base case, and high case)



1. BTPA – Billion Tons Per Annum
2. Low, Base, and High scenarios defined refer specifically to the cargo volume ranges basis highlighted drivers
Source: IPA's Port statistics report, TRW-MoPSW

1.2.2 Growth in Cargo Traffic at Port Clusters

All Indian ports along the coastline have been distributed into eight port clusters (Exhibit 1.34) for Origin-Destination (OD) analysis.

These clusters serve either as origin or destination points for cargo. OD analysis for commodities has been conducted on a point-to-port or port-to-point in the hinterland basis. For example, for Crude oil OD analysis, 1200+ coal fueled power plants in India were mapped for potential status in the next decade (capacity additions, operational status, process type, raw material forecasts, etc.). Also, all operational and upcoming coal fields were analyzed to understand the domestic production potential in each regional cluster. This was used to project in thermal coal imports potential across regional clusters.

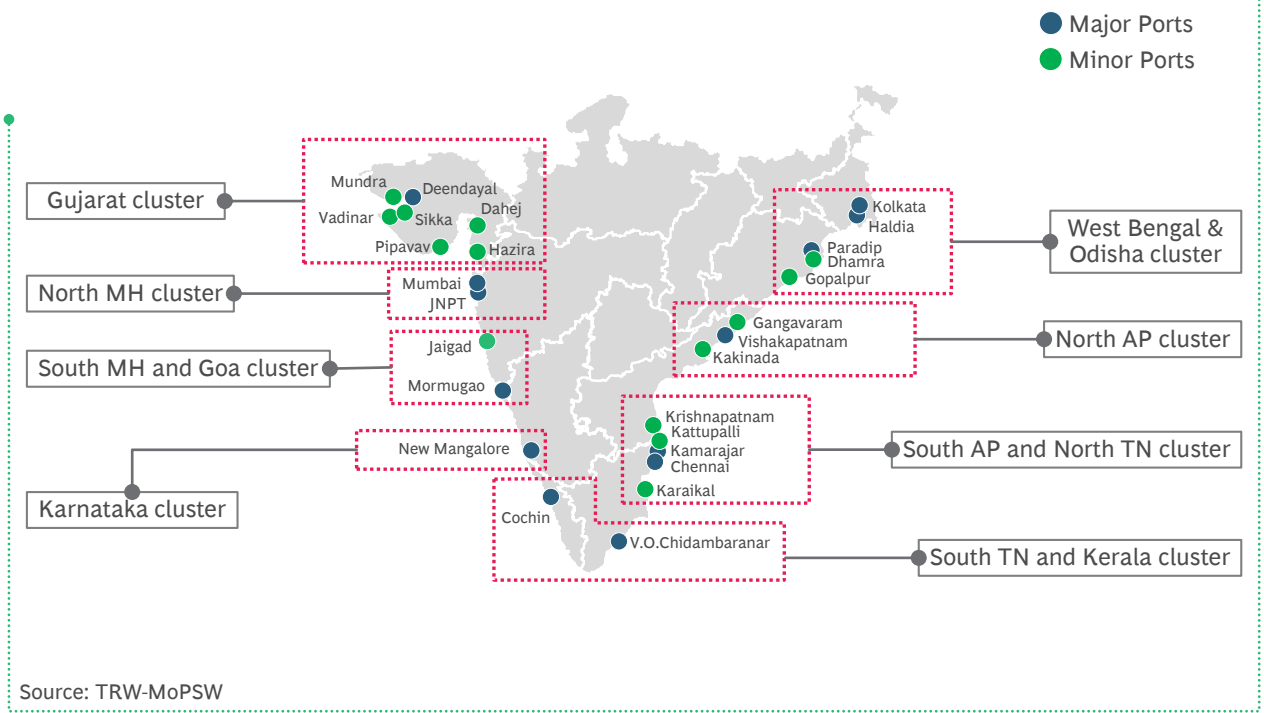
Similar approach has been replicated across other commodities as well. Below exhibits describe the anticipated growth in cargo traffic across key commodities in the next decade for each of the eight clusters. (Exhibit 1.35-1.39).

1.2.3 Capacity Planning and Augmentation

Towards the end of FY 19, the aggregate capacity of Major Ports was 1452.64 MTPA[25] as against 1451.2 MTPA[25] in FY 18. According to international standards, port capacity should be 30% higher than cargo traffic to provide efficient services and lower the average turnaround and pre-berthing time. Major Ports' capacity has been enhanced consistently to meet growing traffic needs, but the increase in traffic has not been proportional to the increase in capacity. Exhibit 1.40 below depicts cargo traffic and capacity utilization across Major Ports during 2018-19.

Each Major Port shall consider commodity-wise

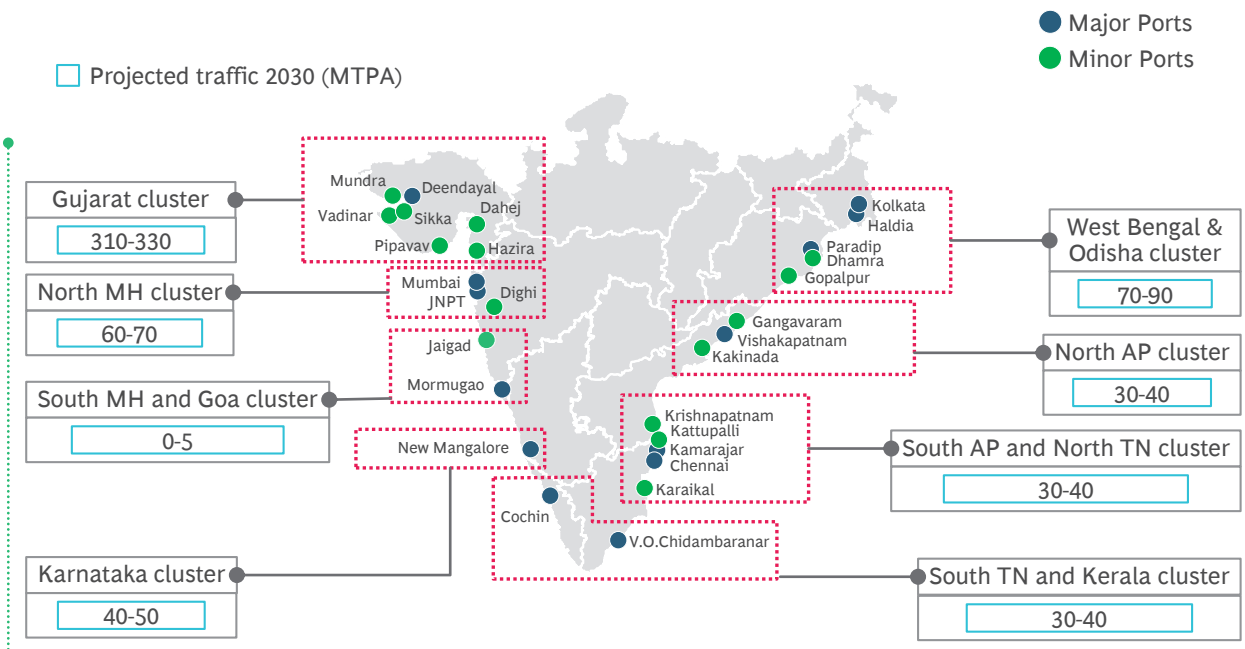
Exhibit 1.34 | Eight port clusters along the coastline for Origin-Destination analysis



Source: TRW-MoPSW

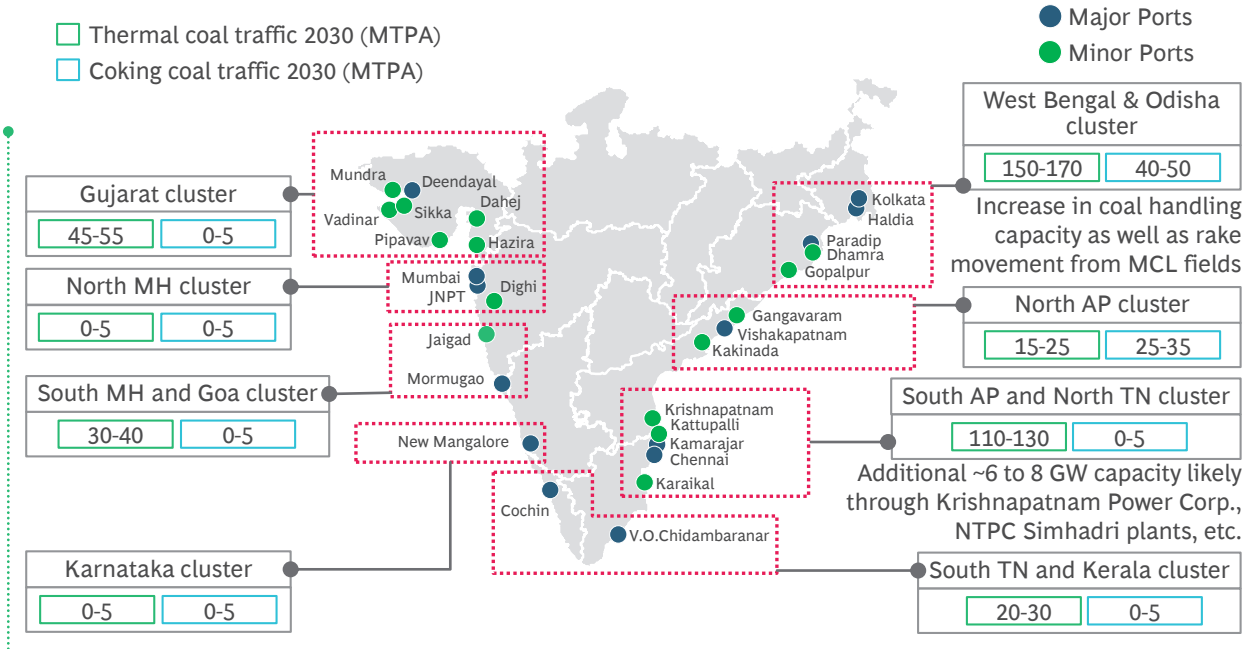
24 Traffic and Research Wing, Ministry of Ports, Shipping and Waterways
25 Indian Ports Association (IPA) Statistics report for FY20

Exhibit 1.35 | Cluster-wise potential POL Traffic by 2030



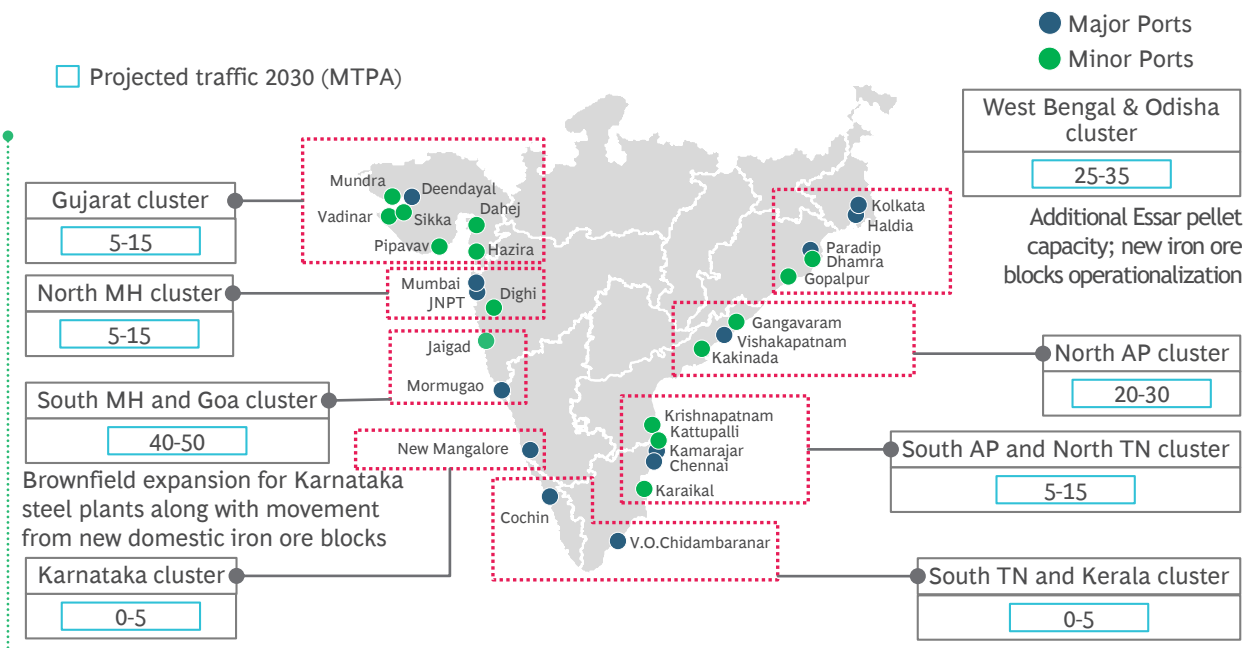
1. FY30 Base case traffic scenario undertaken for cluster-wise modelling and segmentation
Source: Expert discussions, TRW-MoPSW

Exhibit 1.36 | Cluster-wise potential Coal Traffic by 2030



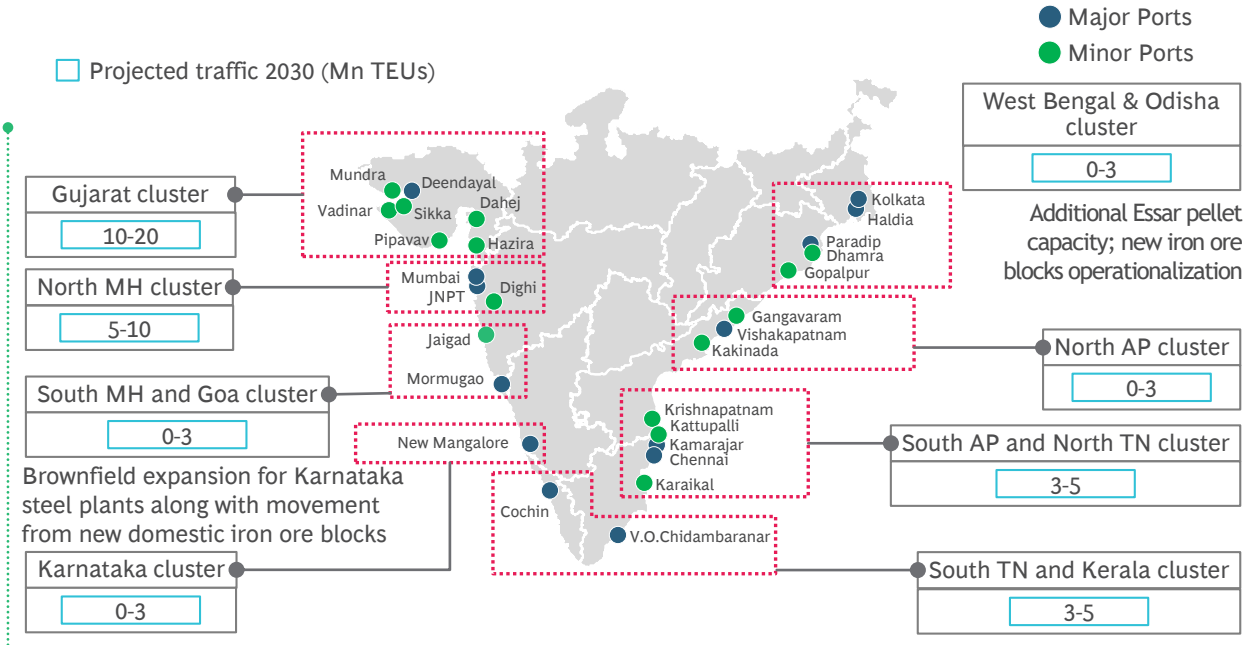
1. FY30 Base case traffic scenario undertaken for cluster-wise modelling and segmentation
Source: Expert discussions, TRW-MoPSW

Exhibit 1.37 | Cluster-wise potential Iron Ore Traffic by 2030



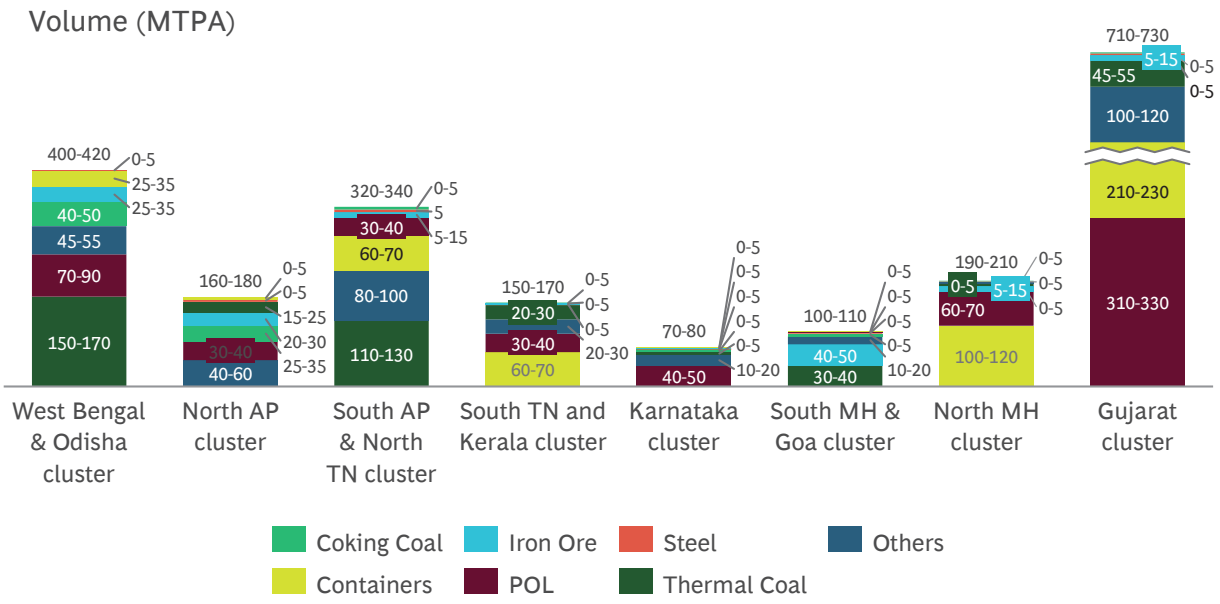
1. FY30 Base case traffic scenario undertaken for cluster-wise modelling and segmentation
Source: Expert discussions, TRW-MoPSW

Exhibit 1.38 | Cluster-wise potential Container Traffic by 2030



1. FY30 Base case traffic scenario undertaken for cluster-wise modelling and segmentation
Source: Expert discussions, TRW-MoPSW

Exhibit 1.39 | Cluster-wise potential Traffic Scenario for Key Commodities by 2030



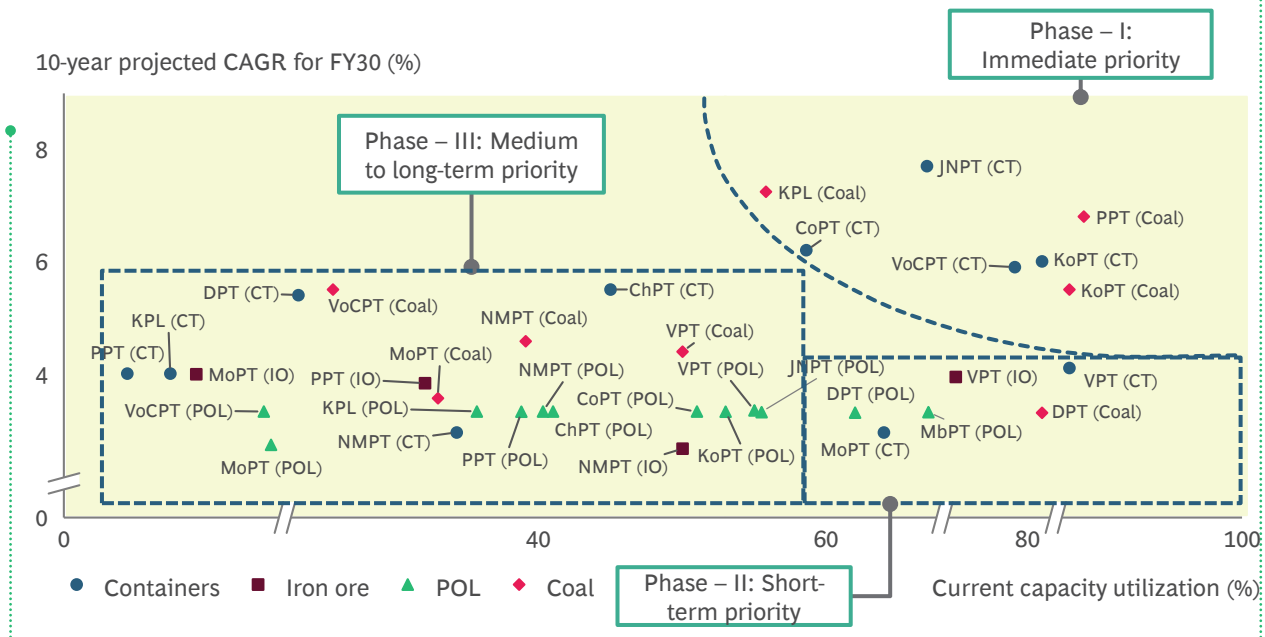
1. FY30 Base case traffic scenario undertaken for cluster-wise modelling and segmentation
Source: Expert discussions, TRW-MoPSW

capacity requirements in line with potential growth in traffic in next decade and reduce inefficiencies like pre-berthing delays, high TRT, etc. Potential areas for capacity expansion have been identified through a multi-variate assessment (Exhibit 1.41) for each commodity driven by two

Exhibit 1.40 | Cargo traffic and capacity utilization across Major Ports during 2018-19

S. NO.	Port/state	Capacity (MTPA)	Traffic handled (MTPA)	Capacity Utilization (%)
1	SMP Kolkata	80.8	63.76	79.0
2	Paradip	233.0	109.30	46.9
3	Vishakhapatnam	126.9	65.30	51.5
4	Kamarajar	91.1	34.50	37.9
5	Chennai	133.6	53.01	39.7
6	V.O. Chidambaranar	95.0	34.34	36.1
7	Cochin	73.6	32.02	43.5
8	New Mangalore	98.4	42.51	43.2
9	Mormugao	62.5	17.68	28.3
10	JNPT	118.3	70.71	59.8
11	Mumbai	78.4	60.63	77.3
12	Deendayal	261.1	115.40	44.2
	All ports	**1452.6**	**699.2**	**48.1**

Exhibit 1.41 | Capacity Expansion prioritization framework



Source: IPA's Port statistics report, Discussion with Major ports, TRW-MoPSW

key factors:

1. Regional cluster-wise traffic growth potential in the next 10 years
2. Current capacity utilization for each commodity across Major Ports

Initiative 1.1:

Drive capacity expansion across Major Ports in phases based on traffic growth forecasts

To ensure that capacity expansion occurs in line with traffic growth potential across regional clusters (Exhibit 1.42) potential areas for capacity expansion are identified and prioritized across three phases (Immediate priority, Short-term priority, and Medium to Long-term priority). Major ports have identified capacity expansion projects based on the following themes (Exhibit 1.43):

1. New berth addition in line with cargo profile
2. Existing berths upgrade to improve handling capacity
3. Existing berths conversion to handle new commodities

As part of MIV 2030, Major Ports need to undertake 423 MTPA capacity addition. A total investment cost of over INR 33,400 Cr. has been envisaged for this capacity expansion. Out of this, approximately 95% capacity expansion is likely to be planned under Public Private Partnership (PPP)/ Captive mode by Major Ports (Exhibit 1.44).

Exhibit 1.42 | Capacity Expansion aligned with potential growth in 2030 traffic

Cluster name	Key traffic growth areas	Key capacity addition projects by Major ports	Expansion opportunities for future evaluation by Major ports
Gujrat duster	• Containers: 100-120 MTPA growth potential • POL: 50-70 MTPA growth potential	• ~27 MTPA container terminal at Tuna Tekra • ~60 MTPA POL capacity additional at Deendayal	• Higher potential for containers capacity additional
North MH duster	• Containers: 50-60 MTPA growth potential • POL : 10-15 MTPA growth potential	• ~30 MTP container capacity additional in BMCT (Phase-II) at JNPT • ~10 MTPA POL capacity addition at Mumbai	
South MH & Goa duster	• General Cargo: 10-20 MTPA growth potential • Coal: 20-30 MTPA growth potential	• ~16 MTPA cargo capacity addition via redevelopment of 4 berth at Mormugao	• Potential to increase coal handling capacity
Karnataka duster	• POL : 10-15 MTPA growth potential	• New berth (~7 MTPA POL capacity) addition by FY25	• 2-5 MTPA container traffic potential: ~6MTPA capacity currently planned to be done in phases
South TN and Kerala duster	• Containers: 40-50 MTPA growth potential • POL: 5-10 MTPA growth potential • Coal: 10-15 MTPA growth potential	• ~28 MTPA container capacity via 4 berths mechanization at V.O.Chidambaranar • ~6 MTPA POL capacity additional at Cochin • ~9 MTPA bulk capacity addition at V.O.Chidambaranar	
South AP and North TN duster	• Coal: 60-80 MTPA growth potential • Containers: 25-30 MTPA growth potential	• ~40 MTPA coal capacity addition through new bulk terminals and modification of iron ore berth at Kamarajar • New Container terminal (~30 MTPA capacity) additional in Phases at Kamarajar	
North AP duster	• POL: 50-10 MTPA growth potential • Coals: 10-15 MTPA growth potential	• ~5.3 MTPA POL capacity additional by FY22	• Potential for coal capacity addition • 3-5 MTPA container traffic potential: ~9 MTPA capacity currently planned to be done in phases
West Bengal & Orissa duster	• Containers: 10-15 MTPA growth potential • Coal: 80-100 MTPA growth potential. • Iron ore: 15-20 MTPA growth potential • POL : 30-40 MTPA growth potential	• 14 MTPA container capacity additional at Kolkata • 30 MTPA coal capacity additional through berth mechanization and new berth additional at Pradip • ~10 MTPA berth additional for iron ore at Pradip • ~10 MTPA liquid capacity addition at Kolkata	

Exhibit 1.43 | Capacity Expansion projects identified at Major Ports as part of MIV 2030

	New berths addition in line with expected cargo profile	Existing berths upgrade to improve handling capacity	Existing berths conversion to handle new commodities
Phase - I	• Extension of ICTT terminal with ~4.5 MTPA container capacity at Cochin port • Extension of BMCT container terminal with ~30 MTPA capacity on DBFOT basis at JNPT port • ~18 MTPA coal handling capacity addition through CB-3 & berths at Kamarajar port • New ~10 MTPA bulk berth development for coal imports at Paradip port	• Modification of Iron ore terminal to ~12 MTPA coal terminal (SIOTL) at Kamarajar port • ~11 MTPA coal handling capacity addition through Multi-cargo and Bulk terminal at Kamarajar port • Setting up Floating Cranes / RMQCs/extended gate facilities for ~8.5 MTPA container capacity addition at Kolkata Dock complex • Mechanization of Berth No. 3 (~3.5 MTPA bulk capacity) on DFBOT basis at Haldia Dock • Mechanization of 5 berths (EQ-1, EQ-2, EQ-3, CQ-1, and CQ-2) for ~23 MTPA coal capacity addition at Paradip port • Mechanization of Berth 3 & 4 for ~16 MTPA container capacity under PPP mode at V.O. Chidambaranar port	• Rejuvenation of KPD berths for ~5.5 MTPA container capacity through PPP mode at Kolkata Dock Complex • Conversion of Berth 9 to handle container traffic (12 MTPA capacity) under PPP mode at V.O. Chidambaranar port

	New berths addition in line with expected cargo profile	Existing berths upgrade to improve handling capacity	Existing berths conversion to handle new commodities
Phase - II	• Construction of 6 Oil jetties at Deendayal dock, 1 SBM at Vadinar, and 2 product jetties at Vadinar for ~44 MTPA POL and liquids capacity at Deendayal port • 4 MTPA Fifth Oil berth addition at Mumbai port • Setting up ~2 MTPA coastal cargo berth at Mormugao port	• Pipeline rationalization for 4 Oil jetties for ~16 MTPA capacity addition at Deendayal port • Setup of Floating Storage Regasification Unit for 5 MTPA capacity expansion at Mumbai port • Extension of container terminal with ~9.5 MTPA capacity on DBFOT basis at Vishakapatnam port	• Re-development of 1 Iron Ore & 3 barge berths to handle general cargo (14 MTPA) on PPP basis at Mormugao port

Source: Major port teams, TRW-MoPSW

Exhibit 1.43 | Capacity Expansion projects identified at Major Ports as part of MIV 2030

	New berths addition in line with expected cargo profile	Existing berths upgrade to improve handling capacity	Existing berths conversion to handle new commodities
Phase - III	• Additional ~4 MTPA multi-liquid terminal at Cochin port • Additional ~27 MTPA container terminal in Tuna Tekra at Deendayal port • Setting up ~2.5 MTPA coastal cargo berth at JNPT port • Addition of liquid cargo terminal with ~4.5 MTPA capacity at JNPT port • New ~31 MTPA Container terminal (in phases) at Kamarajar port • ~3 MTPA IOCL captive jetty at Kamarajar port • Addtion of ~3 MTPA Marine Liquid Terminal on PPP basis at Kamarajar port • Additional ~5 MTPA LNG Terminal in Kukrahati at SMP Kolkata port • Setup of liquid cargo jetties for ~4.5 MTPA capacity at SMP Kolkata port • 2 MTPA Chemicals capacity expansion in Pir Pau at Mumbai port • Construction of new berth No. 17 for ~7 MTPA POL capacity addition at NMPT • New ~10 MTPA iron ore berth development at Paradip port • Development of Mahanadi Riverine Port (Phase-I) for ~21 MTPA capacity at Paradip port • Development of additional ~5.3 MTPA oil handling facility at Vishakapatnam port	• Reconstruction of SCB berth for ~1.5 MTPA POL capacity at Cochin port • Mechanization of Berth No. 14 for ~6 MTPA container capacity addition at NMPT • Development of ~0.6 MTPA LPG terminal at Paradip port • Deepening and Optimization of Inner Harbour facilities for ~25 MTPA cargo capacity at Paradip port • NCB III berth mechanization for ~9 MTPA bulk capacity under PPP mode at V.O. Chidambaranar port	• Conversion of ~4.5 MTPA general cargo berth to mechanized fertilizer handling facility at Deendayal port

Source: Major port teams, TRW-MoPSW

Exhibit 1.44 | 95% Capacity Expansion at Major Ports planned under PPP/ Captive Mode

S No.	Major Port name	Capacity Addition	Investment (Rs. Crore)	PPP / Captive	Internal resources
1	Kolkata Port (KDS & HDC)	27	1408	1285	123
2	Paradip Port	89	10213	10213	0
3	Visakhapatnam Port	15	812	633	179
4	Kamarajar Port	81	3976	3786	190
5	Chennai Port	0	0	0	0
6	V.O.Chidambaranar Port	37	1207	1207	0
7	Cochin Port	10	1405	1384	21
8	New Mangalore Port	13	431	281	150
9	Mormugao Port	16	903	700	203
10	Mumbai Port	11	2062	1946	116
11	Jawaharlal Nehru Port	37	3724	3724	0
12	Deendayal Port	87	7289	6975	314
	Total	**423**	**33429**	**32134**	**1295**

Source: Major port teams, TRW-MoPSW

1.3 World-class Mega Ports

As ships become bigger and specialized, ship cost per day will increase to minimize total transport costs, total ship time in the port must be reduced. This approach has led to an increasing preference for Mega Ports across the globe (e.g. Port of Yangshan, Port of Hedland, etc.) to provide better infrastructure for faster operations and also lowered operational costs for ports by at least 10-15% (Exhibit 1.45).

Currently, India has 5 Major Ports and 2 Non-Major Ports with greater than 100 MTPA[26] capacity. There is a significant opportunity for India to set-up Mega Ports and compete with global ports. (Exhibit 1.46).

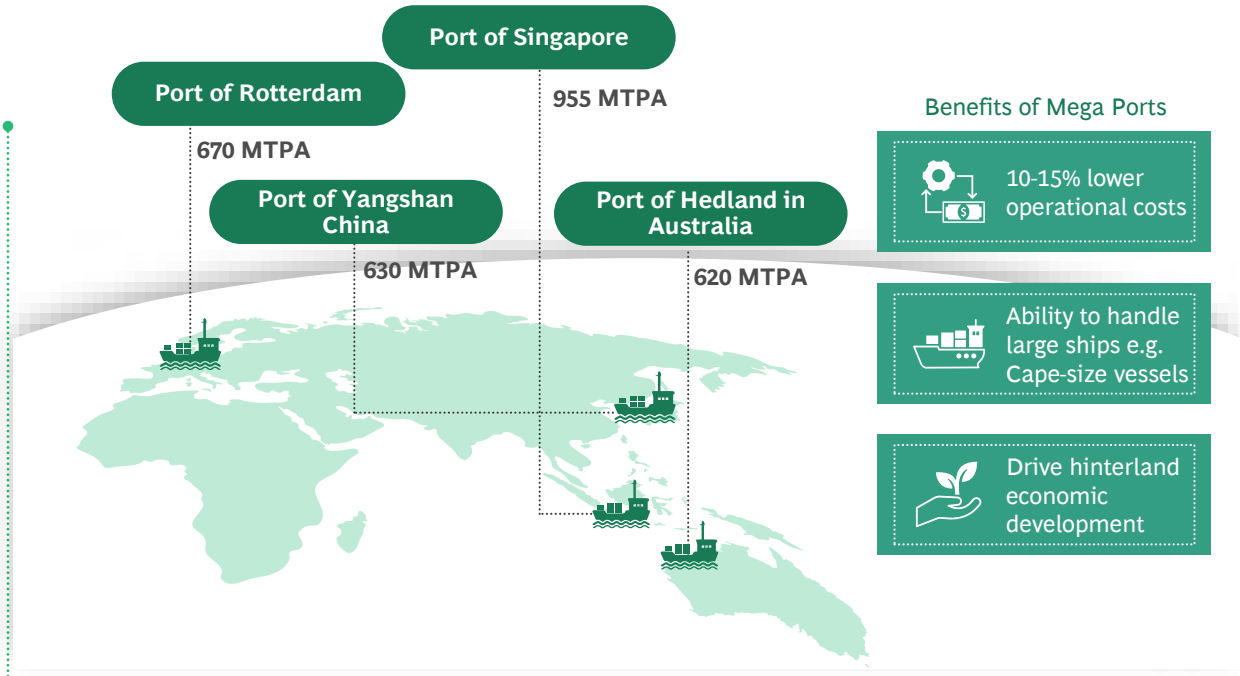
To establish Mega Ports in India, three key criteria need to be considered –

1. Deep-draft availability to handle an increasing number of mega-ships in the future
   - 16 meters deep drafts would be essential to improve cargo handling capacity of Indian Mega Ports as approximately 40% of the future fleet order book comprises of ships of 20,000 TEU capacity or higher (Exhibit 1.47).
2. Effective hinterland connectivity to facilitate best-in-class evacuation
   - Dwell time for exports in global Mega Ports is approximately 40% lower than Indian Ports, thus highlighting the necessity of having an efficient evacuation network to move high volumes of cargo
3. Land availability to create a sustainable industrial ecosystem

Global Mega Ports such as Port of Yangshan, Port of Jebel Ali, etc. have created large industrial ecosystems (industrial clusters, SEZs, FTZs, etc.)

26 Indian Ports Association (IPA) Statistics report for FY20

Exhibit 1.45 | Mega Ports developed / underway in other advanced maritime nations



Source: Respective Port websites; Drewry Maritime Advisors Database; Port of Singapore to reach 955 MTPA in phases

Exhibit 1.46 | India Ports with greater than 100 MTPA capacity

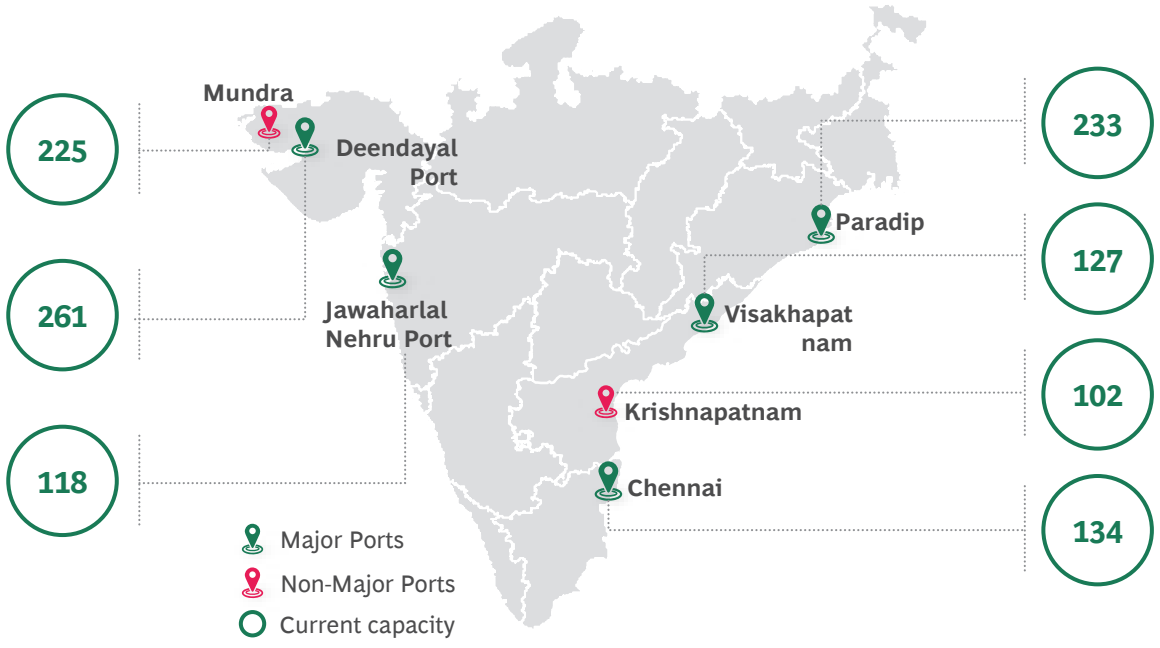
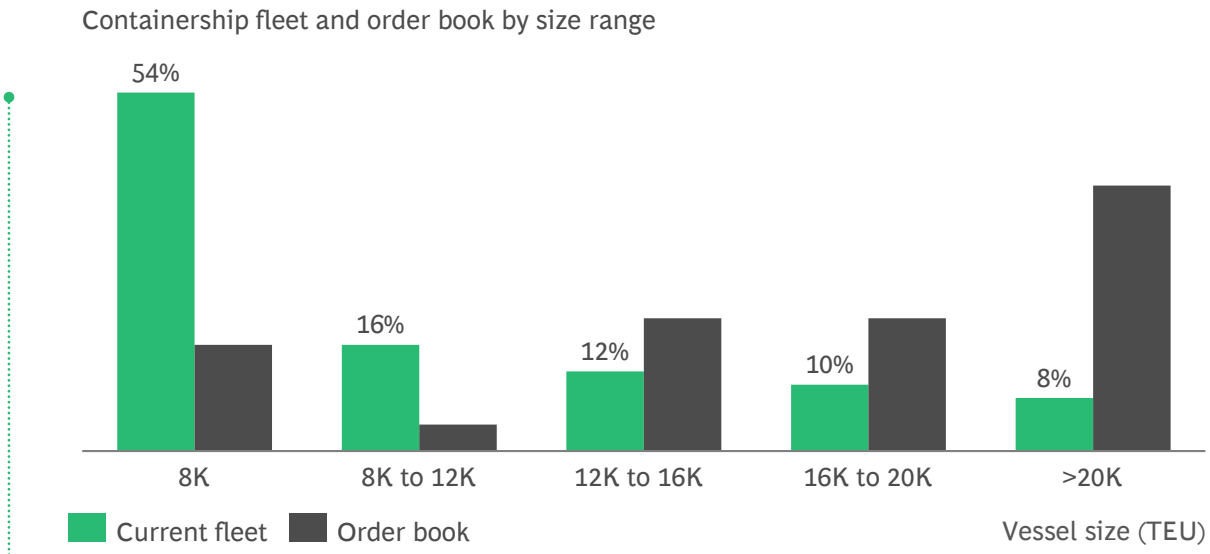


Exhibit 1.47 | Large ship sizes to be the norm in future

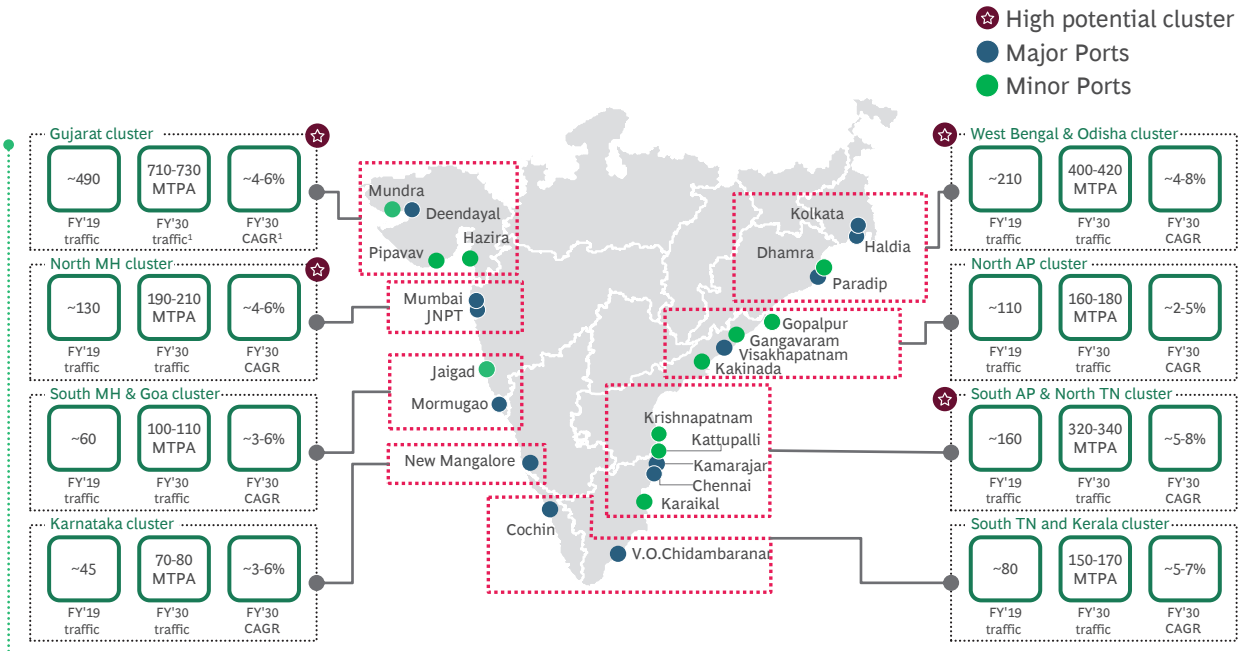


Source: Drewry Annual Review report, IHS Markit

around ports to drive higher cargo throughput Four clusters – West Bengal and Odisha, Gujarat, South Andhra Pradesh and North Tamil Nadu, and North Maharashtra – have emerged as high-potential clusters for the next decade (Exhibit 1.48) basis potential estimates in 1.3.2.

Based on detailed evaluation across key criteria for Mega Ports and emerging growth potential of clusters, 3 Mega Ports – Vadhavan-JNPT Cluster, Paradip Port, and Deendayal Port have been identified to be developed into Mega Ports with >300 MTPA capacity and Kamarajar is to be further evaluated in next 1-2 years for additional Mega Port on the East Coast.

Exhibit 1.48 | High Potential Traffic Clusters for 2030



1. FY30 traffic range mentioned basis Base case scenarios; FY30 CAGR range given across Low to High case traffic scenarios
Source: IPA's Port Statistics report

1 Initiative 1.2:

Develop Vadhavan-JNPT cluster (in phases) on West Coast with 20m deep draft and ~10,000 hectares of land to drive industrialization

Vadhavan and JNPT ports have an available draft of 19m and 16.5m respectively[27] and are therefore well suited for accommodating larger ships. Given the container traffic potential in North Maharashtra and Gujarat cluster, the Vadhavan-JNPT cluster can act as a Mega Port to upcoming West Coast traffic.

The Vadhavan-JNPT port cluster connects with DFC and Mahasamrudhi Marg. Therefore, it can cater to cargo from North & Central India efficiently. It is strategically situated to cater to primary hinterlands of Maharashtra (Mumbai, Pune, Nashik, Aurangabad, etc.) and secondary hinterlands of Southern Gujarat and Madhya Pradesh.

Vadhavan can also act as a gateway port for EXIM cargo of the Tarapur industrial area e.g., steel rods, steel coils, scrap, etc. Moreover, port-land can be utilized to setup suitable industries such as Agri industries, food industries, reefer facilities, etc. SEZ status and at least 10,000 hectares[27] of land acquisition are required to create sizeable industrial clusters at Vadhavan.

Vadhavan port (23 Mn TEU's handling capacity by 2030) and JNPT port (10 Mn TEU capacity by 2023) should be augmented as a Mega Port cluster on the West Coast in a phased manner.

2 Initiative 1.3:

Develop Paradip as World-class Dry-bulk port on East Coast

Paradip is the 2nd largest port in India in terms of overall traffic handled across ports (112 MTPA[28] in 2019-20) and has 17m draft available[29] currently with dredging underway

27 Jawaharlal Nehru Port Trust
28 Indian Ports Association (IPA) Statistics report for FY20

to reach 19.8m by 2023. Given the dry-bulk traffic growth potential in the West Bengal and Odisha cluster, Paradip Port is well-suited to cater to upcoming traffic on the East Coast.

Paradip is located in close proximity to Mahanadi coal fields, hence suitable for coastal transport of coal to southern and western India. It is also well-connected to serve several steel plants in the hinterland[29]. Besides, Paradip is strategically located to cater to iron ore movement for steel plants in southern and western hinterland.

Paradip Port has allocated about 100 acres of land[29] for creating industrial clusters and Multi-Modal Logistics Parks (MMLP). Given its location, it has high potential to set up steel, coal industries, wood-based industries, and Free Trade Warehousing Zones (FTWZ) in that land parcel.

Given its suitability as mentioned above, it is envisaged to develop Paradip Port (in phases) as a World-class Mega Port on the East Coast.

3 Initiative 1.4:

Develop Deendayal – Tuna Tekra (in phases) on West Coast with 19m deep-draft

Deendayal Port is the largest in India in terms of overall traffic handled (123 MTPA[28] in 2019-20). The available draft is currently 15m with the potential[30] to reach 18m+. Given the high traffic growth potential across commodities in the Gujarat cluster, Deendayal – Tuna Tekra Port cluster can serve as a high-potential Mega Port on the west coast.

Deendayal Port is located on the Northern Coast of Gujarat, hence well-positioned to serve both Northern and Western hinterlands such as Rajasthan, Delhi-NCR, Punjab and Haryana. Efficient rail and road connectivity[30] with principal cities like Mumbai, Ahmedabad, Surat, Baroda provide efficient evacuation opportunities for EXIM cargo owners.

Approximately 1000 acres of land[30] is available at Deendayal Port for industrialization purposes. Also, approximately 580 acres of land[30] has been identified for township and community development.

Given its suitability as mentioned above, it is envisaged to develop Deendayal Port (in phases) as a World-class Mega Port on the West Coast.

4 Initiative 1.5:

Evaluate and develop Kamarajar (in phases) on East Coast

Kamarajar currently has a maximum draft of 16.5m[31], with the potential to achieve 18m+ for accommodating mega-ships. With adjacent South Andhra Pradesh and North Tamil Nadu clusters having high growth potential for bulk and container traffic, Kamarajar port exhibits high potential to develop into another Mega Port on the Southeast Coast.

It is also located[31] favorably to cater to the Chennai cluster's trade needs and the proposed CBIC (Chennai- Bangalore Industrial Corridor). Moreover, Kamarajar is also well connected to multiple thermal power plants in the hinterland like Neyveli Lignite Corporation, TANGEDCO, and more.

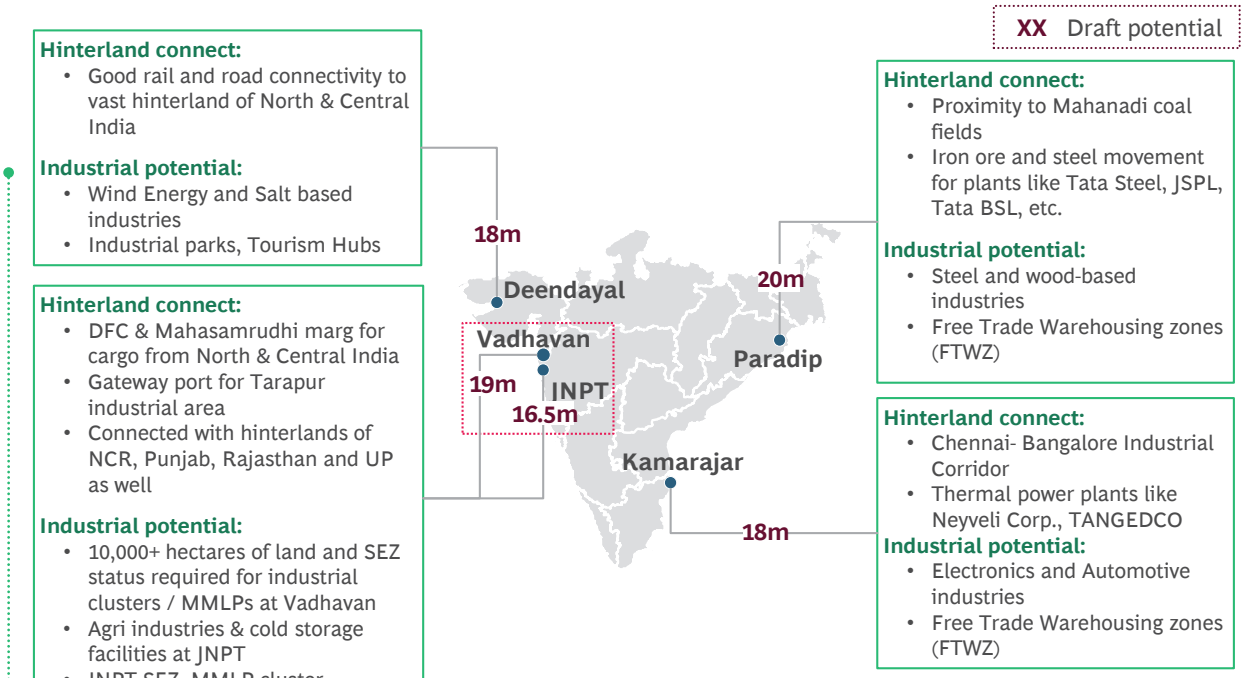
A study of the surrounding areas and hinterlands demonstrates high potential to set up electronic sector industries, automotive industries, Free Trade Warehousing Zones (FTWZ), and tourism hubs. At least 2,000 hectares of land[31] acquisition is required for creating industrial clusters and Multi-Modal Logistics Parks (MMLP) at Kamarajar.

Therefore, a detailed techno-economic feasibility study shall be undertaken to finalize a detailed development plan for Kamarajar as a Mega Port on the East Coast which will cater to EXIM Trade in Southern India.

These Mega Ports on both East and West Coasts will be able to cater to high traffic potential in the next decade and develop Indian Port's strategic importance in the South Asian region (Exhibit 1.49).

29 Discussions with Paradip port team
30 Deendayal Port Trust
31 Kamarajar Port Trust

Exhibit 1.49 | Mega Ports on East and West Coast



Source: IPA's Port Statistics report, Expert discussions

1.4 Transshipment opportunities in India

Indian Ports handled ~16.1 Mn TEUs[32] of container cargo in 2019. Nearly 75% of this cargo was gateway (12 Mn TEUs), while ~25% was transshipped (TS) enroute to the destination (4.1 Mn TEUs). Currently, nearly 75% of India's transshipped cargo is handled at ports outside India. Colombo, Singapore and Klang handle more than 85% of this cargo, with Colombo alone handling approximately 2.5 Mn TEUs[32] (Exhibit 1.50).

India needs to setup transshipment port alternative that can match competing international ports with regard to location, draft and overall cost economics. This is essential due to following reasons:

1 Approx. $200-220 Mn[33] of potential port revenue (opportunity) loss per annum

Indian ports lose up to $200-220 Mn of potential revenue each year on transshipment handling of cargo originating/destined for India. The loss is even higher when considering the opportunity to handle cargo emerging from other countries in the region.

2 Inefficient logistics for a large segment of India's EXIM industry situated in South India

Given the extra port handling charges incurred at the transshipment hubs, transshipment of cargo results in logistic cost inefficiencies for Indian industry. The additional port handling cost is to the tune of USD 80-100 per TEU[34], which could be saved if the container was imported/exported as direct gateway cargo instead of being transshipped.

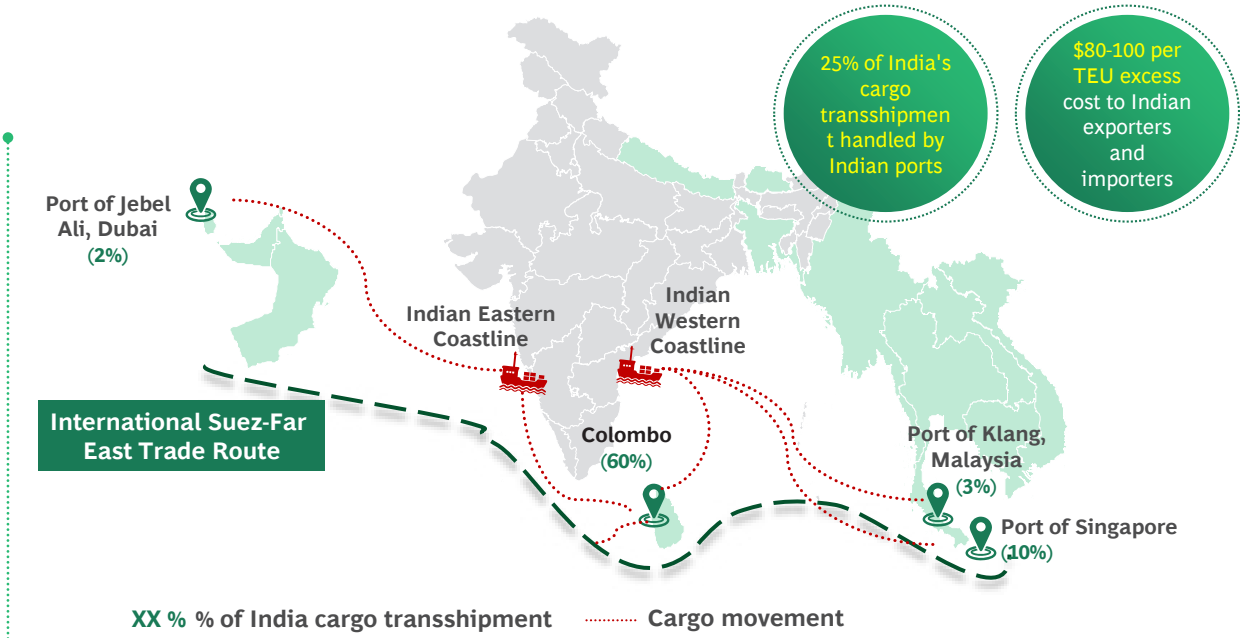
3 Opportunity to become a large transshipment hub for trade between the US, EU, Africa and Asia

Container transshipment in Asia mainly occurs on three key routes –

- US/ Europe to/from the Far East
- Africa to/from Asia, primarily the Far East
- US/ Europe to/from India and Indian subcontinent

The routes to/from Europe and America are the most significant currently, but Africa-bound traffic is set to grow faster (6-7%) over the next decade[35]. While most of the transshipment trade happens in the South East Asian and Middle East clusters, locations in Southern India are geographically an efficient location for transshipment of cargo moving to Africa, EU or East Coast of America.

Exhibit 1.50 | Current Transhipment scenario in India



4 Mitigate risk to Indian trade due to dependence on international ports

With 75% of the country's transshipment cargo being handled at international ports, this makes Indian industries vulnerable to increase in costs, potential inefficiencies, and congestion issues, and creates long term risks for India's trade competitiveness.

A strong economic case therefore exists for enabling a transshipment hub in Southern India that can attract Indian and regional transshipment traffic from the current hubs, save significant revenue loss, reduce logistics inefficiencies for Indian trade, reduce risks to country's export competitiveness and create an opportunity for India to become a large hub for Asia-Africa, Asia-US/Europe container traffic trade.

1.4.1 Key Success Factors for an Indian Transshipment Hub

Globally, countries have carefully planned and undertaken targeted interventions to ensure success of a transshipment hub. Several factors need to be considered at both port and central government level to ensure the success of a transshipment hub.

The Malaysian government undertook a set of notable interventions[36] to ensure the success of Port of Tanjung Pelepas (PTP) –

1. Offered several incentives to get anchor client, APM investing 30% stake in PTP and Maersk shifting most operations from Singapore to PTP
2. Leveraged gateway traffic to its advantage through duty imposition on trucks going out of Malaysia to redirect traffic for the PTP

32 Indian Ports Association (IPA) Statistics report for FY20
33 Assuming $60 to $70 port charges basis current VoCPT and Colombo port rate ranges
34 Illustration for a cargo movement from Madurai using trans-shipment in Colombo and shipping to Antwerp in Europe
35 Drewry Maritime Advisors Annual Report FY20, Expert discussions
36 Alphaliner database, Expert discussions

3. Focused on high port productivity and efficiency right from the design stage
4. Ensured feeder network availability by opening the carriage of transshipment containers for foreign ship owners from Port Klang and Tanjung Pelepas to ports in Kuching, Bintulu and KK

Based on learnings from successful global transshipment hubs, factors have been identified for a transshipment hub which influence routing decisions of mainliners (Exhibit 1.51):

1 Availability of deep draft

Global vessel sizes have significantly increased in the last decade, and most mainliners typically prefer calling at ports with at least 18m draft. To that end, the availability of adequate draft has become a crucial factor in attracting shipping lines.

The current ports in southern India – such as Cochin and V.O.Chidambaranar - have insufficient drafts of 14.5m and 14.2m respectively. Vizinzham, Kanyakumari region and Campbell Bay, on the other hand, have deep draft potential of ~20m (Exhibit 1.54).

2 Proximity to maritime routes[37]

The Suez route accounts for a significant share of the total global container traffic flows, and the mainline vessels use this route for transporting cargo between the US, Europe and Asia. Liners prefer minimum deviation from their courses when selecting a transshipment port. As demonstrated in Exhibit 1.52, it is evident that all current ports on the East and West coasts of India are at a distance of greater than 5 hours of voyage from the shipping route, which makes these locations unattractive for transshipment as compared to Colombo which is at 0.5-1 hours of voyage from the shipping route.

Vizinzham, Kanyakumari region and Campbell Bay are promising locations given their position at approximately 6-10 Nautical Miles (NM) deviation (0.5-1 hours) from the Suez route.

3 Hinterland connectivity & Gateway cargo

The presence of significant assured gateway cargo is often a big factor in liners' decision to move to a new location since it brings down the volume risk. This also becomes a key differentiator as it drives a larger scale of

Exhibit 1.51 | Factors influencing Routing Decisions of Mainliners

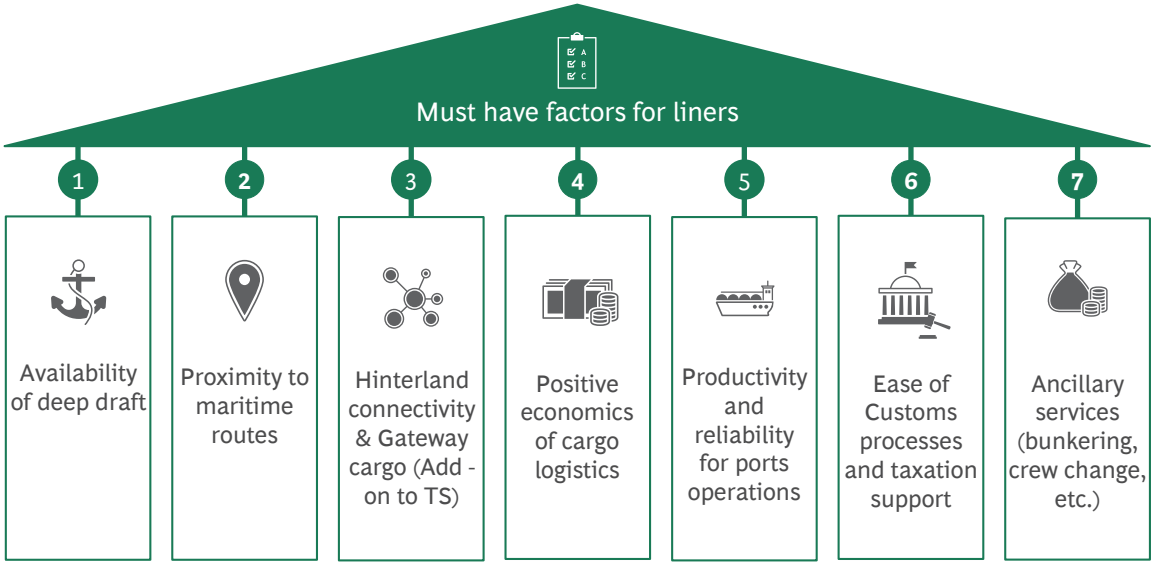
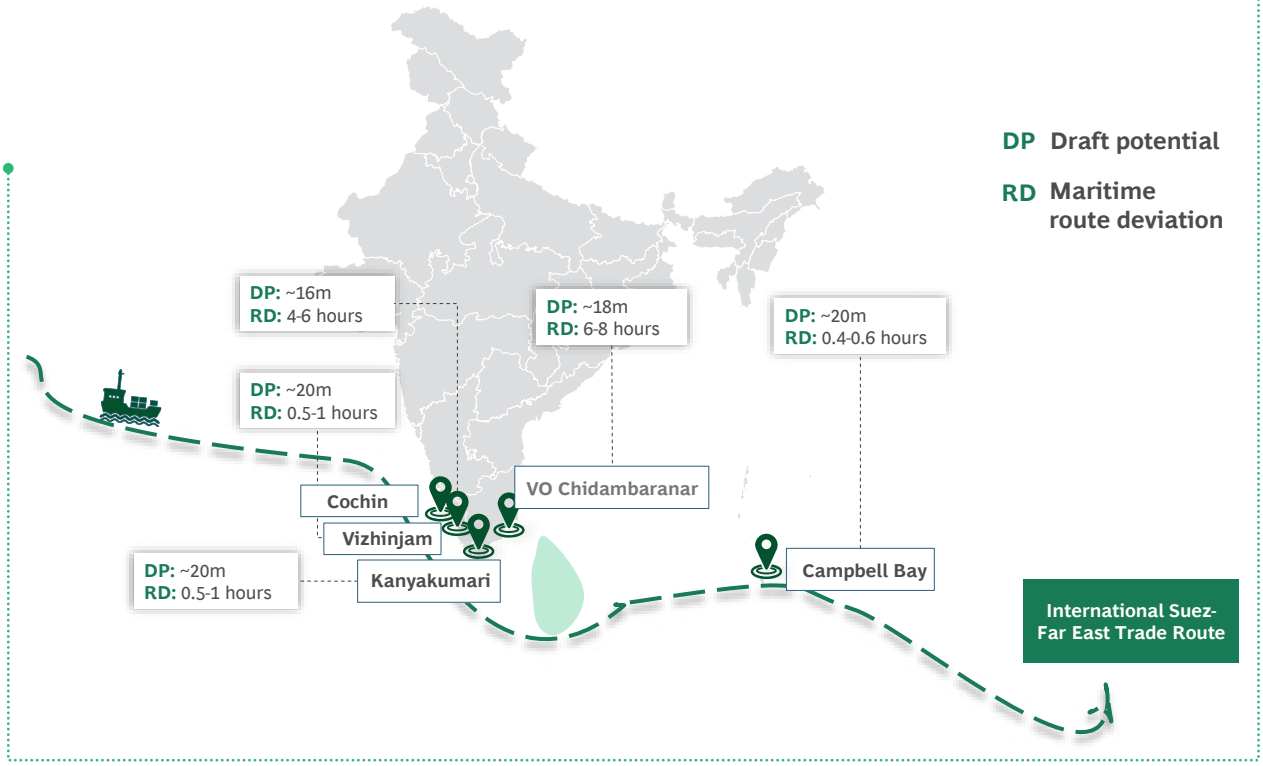


Exhibit 1.52 | Mainliners prefer proximity to maritime routes



operations for the liners and allows them to combine their gateway traffic with transshipment traffic without the need for a feeder movement.

A large share of transshipment traffic from South Indian ports, around 40-50%, could be redirected as gateway cargo at India transshipment hub, given better logistic cost economics.

4 Positive economics of cargo logistics

For Indian transshipment hub to be successful in attracting traffic, it is critical to match the port charges with competing ports, especially Colombo Port. It might be critical to give a discount over and above the port charges of Colombo Port for the following reasons:

- To make it economically viable for shipping lines to invest in capital cost of shifting existing operations (building facilities/infrastructure for employees, office buildings, etc.)
- Provide an economic incentive for liners to shift and incur the cost of re-configuring their routes
- To counter the cost of additional shipping time for feeder traffic

5 Productivity and reliability for ports operations

High productivity and reliability are critical for mainliners given an hour lost on a vessel can result in losses of approximately USD 5000 – 8000[38]. Productivity and reliability, in turn, depends on the design of the port and efficiency of port labor.

6 Ease of Customs processes and taxation support

Customs clearance process in Indian ports is perceived to be more complex and time-consuming than global ports, which leads to a high turnaround time and cargo lead times in India. Simplification and digitization of customs processes are required

37 IPA's Port Statistics report, IHG International database, Searates
38 IPA's Port Statistics report, IHG International database, Searates

7 Ancillary services

In addition to infrastructure and reduced costs, support services also play a crucial role in attracting and retaining mainliner ships such as –

- Availability of bunkering at a competitive cost
- Ship repair and building
- Crew change services
- Ship channeling and anchorage
- Off-port and in-port bunkering services
- Emission monitoring

Apart from this, India's transshipment hub's success will also depend on its ability to convince a significant shipping liner to become an anchor client and re-route its traffic from the competing ports. Mainliners take a long-term view and consider several factors while deciding their preferred port of call. Consultations with leading shipping liners, Indian and International port operators, and other major container ports in the world have brought forth the following key imperatives that may influence liners to move traffic to a new port in this region:

- ~15-20% lower costs vs. Colombo through lower port charges and potential waiver of service tax (for at least the initial 5 years)
- One of the top liners as an anchor investor for the port
- Ensure high evacuation speed by establishing last-mile road and rail connectivity with the port (for gateway traffic)
- Simplification and digitization of customs processes

Initiative 1.6:

Develop a Transshipment Hub in Southern India

Based on the detailed study of the "Must-have" factors highlighted above, Kanyakumari region and Campbell Bay shows strong potential for a transshipment hub (Exhibit 1.53). A phase-wise development approach needs to be undertaken to ensure success as follows –

- Prioritize development of Vizhinjam in the short-term (1-3 years) by providing required support from Central Govt.
- Setup additional transshipment hub in the Kanyakumari region (5-8 years) under the guidance of V.O. Chidambaranar port
- Set up additional transshipment hub in the Campbell Bay (5-8 years) in a phased manner
- Enhance Transshipment volumes at Cochin Port (1-2 years)

1.5 Infrastructure Modernization

Initiative 1.7:

Accelerate landlord model adoption for berth operations across Major Ports

Currently, approximately 28% of the berths across Major Ports are under PPP/captive mode[39], which handle around 51% of the total cargo (Exhibit 1.54).

Discussions have led to identification and prioritization of 39 berths across Major Ports for landlord model adoption in Phase-1. A detailed implemented roadmap is to be developed by respective ports (Exhibit 1.55).

As part of the long term strategic interventions, Major ports need to move to a landlord model and bring in more private sector participation to drive operational efficiency.

Initiative 1.8:

Maximizing mechanized bulk berth operations across Major Ports

With evolving ship types and increasing parcel sizes at ports, loading and discharge rates have to be enhanced in the next decade. It emphasizes the need of increased mechanization at Indian ports where all berths should be adequately equipped with high capacity cranes, conveyor systems, Harbour Mobile Cranes (HMC's), grab unloaders, etc. Based on learnings from global ports, five world-class mechanization models to be evaluated by Major ports to improve berth productivity (Exhibit 1.56).

Considering regional-cluster wise growth potential for each commodity, current berth occupancy, draft availability at berth, and berth structural integrity, a framework was used to assess and prioritize berths for mechanization. This has led to identification of 21 berths across the Major Ports as high potential candidates for mechanization in Phase-1, and the remaining 87 berths can be undertaken after re-evaluation in the next 2-3 years (Exhibit 1.57).

39 IPA's Port Statistics report FY20

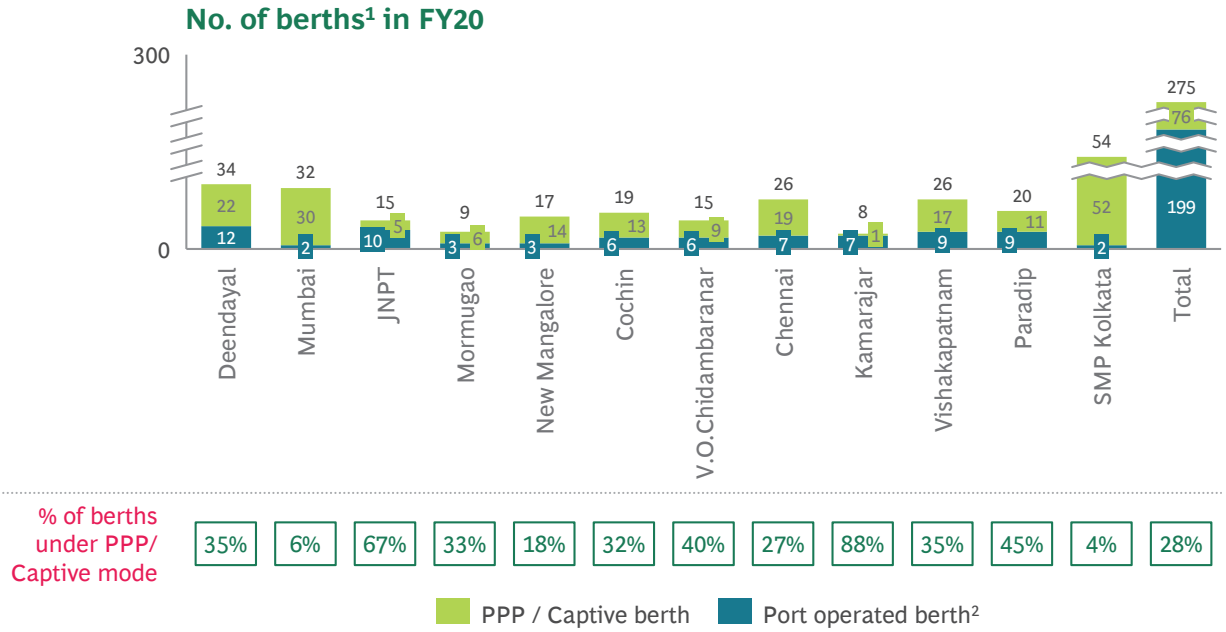
Exhibit 1.53 | Vizhinjam, Kanyakumari and Campbell Bay are strong contenders for a TS hub

Parameters	Campbell Bay	Vizhinjam	Kanyakumari	V.O. Chidambaranar	Cochin
Availability of deep-draft	~20m depth	~20m depth	~20m depth	~14.2m depth; can be increased up to 16m	~14.5m depth; can be increased up to ~18m
Proximity to maritime routes (e.g. Suez-far trade route)	~0.4-0.6 hours voyage time	~0.5-1 hours voyage time	~0.5-1 hours voyage time	6-8 hours; ~11X of Kanyakumari region	4-6 hours; ~7X of Kanyakumari region
Hinterland connectivity[1]	 Key concern – last mile road & rail connectivity	 Key concern – last mile road & rail connectivity	 Four-laning of NH 47 and doubling of rail lines required	 Good connectivity to clusters like Madurai, Chennai, etc.	 Connected to key hinterland market of ~6.5 Lakh TEUs
Positive economics of cargo logistics	Need to ensure ~15-20% lower costs vs. Colombo through lower port charges (at least for initial ~5 years)				
Productivity & reliability	At par or better vessel turnaround performance w.r.t regional transshipment ports e.g. Colombo, Singapore, etc.				
Ease of Processes	Potential waiver of service tax and digitization of customs processes to ensure lower costs/TAT				
Ancillary services	Provision of additional support services such as bunkering, crew change, ship chandling, etc.				
Other considerations		~20 months[2] delayed; raw material and connectivity issues	Resistance & concerns raised by local population		

1. Basis Discussions with Major Ports teams and Industry Experts
2. Estimated timeline as of Apr'20 (Pre-COVID) with respect to announced date of 1st Sept,2018 by M/S Adani Co.

Source: IPA's Port Statistics report, Discussions with Major port teams, Drewry database, Searates, Expert discussions

Exhibit 1.54 | Percentage of PPP/ Captive berths at Indian Ports



1. Only operational berths considered as of FY20
2. Port berths include following types - Privately operated (Stevedoring agent) and port operated berths

Source: IPA's Port Statistics report, Discussions with Major Port Teams

Exhibit 1.55 | 39 Berths across Major Ports identified for Landlord Model Adoption

Port	Berth details	Timelines
Paradip	EQ –I, EQ –II and EQ –III	2023
	CQ-1, SQB and CQ-II	2025
Cochin	NCB Berth	2025
V. O. Chidambaranar	Berth 9 and NCB-III	2022
	Berth 1, 2, 3, 4, 5 and 6	2025
Deendayal	Berth 13, 14, 15 and 16	2025
SMP Kolkata	Berth 1, 2, 5, 9, 10, 11, 12 and 14	2025
Mormugao	Berth 9, 10 and 11	2022
New Mangalore	Berth 9, 10, 11, and 14	2023
Vishakapatnam	Berth EQ 7, WQ 7 and WQ 8	2022
JNPT	CB-01 and CB-02	2023

1. Only operational berths considered as of FY20
2. Port berths include following types - Privately operated (Stevedoring agent) and port operated berths

Source: IPA's Port Statistics report, Discussions with Major Port Teams

Exhibit 1.56 | Mechanization Models to improve Berth Productivity

Model type	Model	Situational applicability
1 Full mechanization	1a Grab discharge cranes + conveyor/ stacker reclaimer + wagon tippler/loader	• Deep draft berths discharging cape size vessels • Berths requiring productivities of 50K to 100K TPD
	1b Mobile harbor cranes + conveyor/ stacker reclaimers + Wagon tippler/loader	• Moderate draft berths where productivity and efficiency of ground operations are a concern
2 Partial mechanization /Addition of equipment	2a Mobile harbor cranes	• Berths where productivity is primary concern
	2b Conveyor systems	• Berths where ground operations is a concern
	2c Rake loader/tippler	• Situations with high rake turn around times where rake operations are a bottleneck

4-step approach undertaken for berth assessment across ports

List of berths

Potential to mechanize

1a Commodity growth potential

1b Current berth Occupancy >= 50%

1c Draft >= 10 meters

1d Berth structural integrity

Feasible berths for mechanization

Source: Expert discussions

Exhibit 1.57 | Mechanization of 21 Berths across Major Ports in Phase 1

S No.	Port	Berth name	S No.	Port	Berth name	S No.	Port	Berth name
1	V. O. Chidambaranar	NCB III	8	Mormugao	Berth 9	15	P Kolkata	B/3
2	Paradip	Central Quay-II	9	Mormugao	Berth 10	16	Chennai	13A
3	Paradip	Central Quay-I	10	Deendayal	CJ-16	17	Cochin	NCB Berth
4	Paradip	South Quay Berth	11	Deendayal	CJ-15	18	New Mangalore	Berth 6
5	Paradip	East Quay-III	12	Deendayal	CJ-14	19	Vishakapatnam	WQ-7
6	Paradip	East Quay-I	13	Deendayal	CJ-13	20	Vishakapatnam	WQ-8
7	Mumbai	21 ID	14	SMP Kolkata	B/9	21	Paradip	East Quay-II

Major ports can evaluate berth mechanization through landlord model

Source: IPA's Port Statistics report, Discussions with Major Port Teams

Initiative 1.9:

Implement terminal wise adequate draft strategy in line with cargo profile

The shipping industry is moving towards mega-size vessels, with more than 40% of the order book in next 3-5 years accounted by ships of size 20,000 TEU and above[4]. While a Capesize vessel required upwards of 18m draft, draft at Indian ports varies widely from 7m to 20m[1]. Ports must increase draft according to the respective cargo profile.

Indian container terminals must target a minimum of one berth with 16-16.2m draft and container terminals with mainline calls must target 18m+ draft by 2030

For the bulk segment, a significant reduction in transportation cost is observed with economies of scale as we move from Panamax to Capesize vessels. Approximately USD 1 to USD 2 per ton savings are possible between a full load Panamax and small Capesize vessel for coastal & international routes, respectively. Only 60% of Indian bulk berths currently are Panamax class compliant. Hence, all Indian bulk terminals must target maximum possible berths as Panamax class compliant and a minimum of one Capesize compliant berth, especially for ports with at least one Capesize call per week.

1.6 Conclusion and Summary

Four key areas were identified to enable India to meet its EXIM growth requirements as well as have a growing share of the regional and global maritime trade:

1. Augment ~20% capacity through brownfield expansion across Major Ports in line with traffic growth projections for commodities.
2. Develop Mega Ports with World-class infrastructure. 3 Mega Ports – Vadhavan-JNPT Cluster, Paradip Port, and Deendayal Port with >300 MTPA capacity and Kamarajar to be evaluated for additional Mega Port on the East Coast.
3. Operationalize Vizhinjam port in short-term and setup additional transhipment ports in Kanyakumari and Campbell Bay

Exhibit 1.58 | Vision 2030 Targets

Category	KPI metric	Current	Target (2030)
World class Mega ports	No. of Major ports with 300 MTPA+ cargo handling capacity	–	3 ports[1]
	No. of ports with 18m+ draft availability to handle main line calls	5	9 ports[1]
Transshipment hub	% of Indian cargo transshipment handled by Indian ports	25%	>75%
Infrastructure modernization	% of Cargo handled by PPP/Captive/ O&M parties across Major Ports	51%[2]	>85%

1. Vadhavan-JNPT cluster, Paradip, Deendayal (Tuna Tekra) identified as per current estimates
2. Basis all berths data from major ports and IPA's Major ports statistics report 2018-19

40 IPA's Port Statistics report, Discussions with Major and Non-Major Ports
41 Drewry Maritime Advisors Annual Report, IHS Markit

regions in a phased manner. This will enable India to address the current revenue losses to adjacent transhipment hubs and take advantage of its attractive position on global maritime routes.

4. Modernizing Major Ports infrastructure through PPP model. Key targeted improvements include landlord model acceleration, maximizing berth mechanization and increasing draft availability to enable handling of mega ships.

As part of Vision 2030, globally benchmarked targets have been defined to help India develop best-in-class port infrastructure (Exhibit 1.58). The development of Indian Ports is estimated to drive cost savings to the tune of INR 6,000-7,000 Cr per annum for EXIM clients and help unlock INR 70,000 – 75,000 Cr worth of potential revenue. Further, the augmented operations are estimated to create an additional ~700,000-1,000,000 jobs in the sector, another compelling reason to undertake the various initiatives identified in this chapter (Exhibit 1.59).

Exhibit 1.59 | Vision 2030 potential Impact

	Potential impact		Rationale for estimation of impact created
Impact on economy	~7,00,000 – 10,00,000	Additional jobs creation[1]	Both direct and indirect jobs creation with increasing port throughput
Impact on trade	INR 6,000 – 7,000 Cr.	Cost savings to EXIM clients[2]	Cost savings per annum to EXIM clients with reduced cost per TEU of transshipment containers
Impact for ports	INR 1,00,000 – 1,25,000 Cr.	Investment	Investment for port capacity augmentation and development of World class infrastructure (Major and Non-major Ports)
	INR 70,000 – 75,000 Cr.	Incremental value unlock for ports[2]	Basis World class Mega ports, capacity augmentation across all ports, and re-gaining >90% Indian TS cargo from international ports

1. ~505 MTPA of container traffic projected in FY30; 40% TS traffic assumed; ~90% Indian TS cargo assumed to be handled at Indian TS hubs; ~$80-$100 per TEU excess cost currently
2. ~300 MTPA at Vadhavan by FY30; ~1030 MTPA capacity addition with Mega ports and brownfield expansion at all ports; INR 200 per ton revenue for ports with 60% capacity utilization

CHAPTER 2

E2E Logistics Efficiency & Cost Competitiveness

E2E Logistics Efficiency & Cost Competitiveness

2.1 Current landscape

Maritime logistics is an important component of the Indian economy, accounting for 95% of EXIM trade by volume and 65% by value[1]. Coastal and inland waterway transportation is energy efficient, eco-friendly and reduces logistics costs for domestic freight. Despite significantly lower costs, water transport accounts for ~6% of total freight movement[2] in India in ton km terms. Industrial development has not fully utilized the structural advantages of efficient supply chains leveraging proximity to coast.

Logistics costs account for a large part of the Indian nonservices GDP compared to other developed nations. EXIM containers in India travel a distance of 600 to 700 km between production centres and ports, compared to 300 to 400 km in China[3]. Lack of seamless connectivity across various logistics modes and complexity in procedures contribute to high variability in transit times. High variability of transit time impacts trade and increases costs with regard to higher inventory stocks etc.

Indian ports have potential to improve vessel turnaround time and cargo dwell time, which affect the overall logistics cost to the customer. As volumes are expected to increase, especially driven by a rise in coastal shipping, it is essential that Indian ports focus on improving service metrics to benefit trade.

Adequate road and rail connectivity linkages need to be developed in tandem with port development. Today port land is not optimally utilized for setting up industries. Raw material often travels a large distance from coastal areas to the hinterland and then finished products travel back from the hinterland to the port. This reduces competitiveness of Indian exports and manufacturing compared to other exporting countries.

Four focus areas have been identified to improve logistics efficiency and cost competitiveness for maritime logistics:

1. Cargo Modal Shift and Coastal Shipping
2. Reducing Cost of Doing Business (CoDB)
3. Improving Operational Efficiency and Evacuation at Ports
4. Port-led Industrialization

2.2 Cargo Modal Shift and Coastal Shipping

India has a long and contiguous coastline spanning 7,500 km and extensive navigable inland waterways providing an excellent opportunity to tap an environmentally friendly water based modal transport, which can complement rail and road-based cargo movement. Currently, coastal and inland waterways contribute ~6% of the country's freight modal mix, while adjacent developing economies, such as Bangladesh (16%) and Thailand (12%) have a higher share of water-based transport[4], highlighting the scope for improvement for India.

Improvement of water-based transport share would lead to lowering of logistics costs for end-user industries as water-based transport is inherently cheaper than rail and road modes. Also, other indirect benefits such as reduced air and noise pollution and reduced rate of accidents would benefit the economy as a whole.

However, development of water-based transport would require development of effective multimodal solutions as first mile/last mile connectivity, lead times and costs become important

1 Indian Ports Association (IPA) Statistics report for FY20
2 Ministry of Ports, Shipping and Waterways FY20 Annual Report
3 Expert discussions
4 Respective Country Shipping Annual Reports

factors for ensuring a shift from door-to-door services provided by road and rail-road modes. Thus, an integrated approach to development is required to design the most cost-effective and hassle-free logistics solutions for end-user industries.

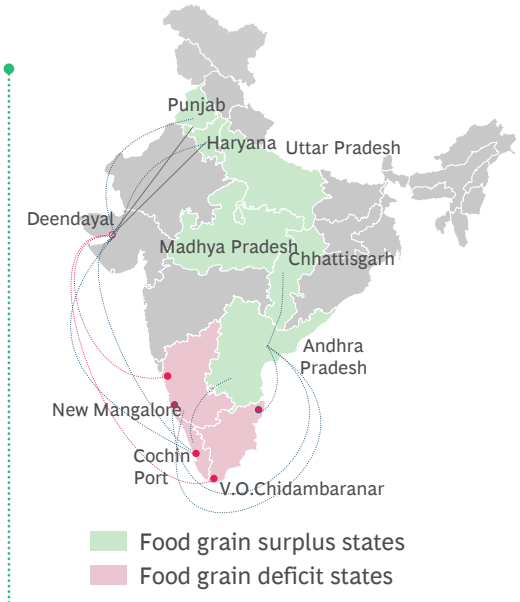
Ministry of Ports, Shipping and Waterways has undertaken several initiatives in the last 4 years to facilitate coastal shipping such as incentivizing creation of coastal berths, reducing port tariffs for coastal cargo, provisioning green-channel clearance of coastal cargo, prioritizing berthing of coastal vessels and relaxation of cabotage rules for increasing vessel availability. Approved initiatives have led to an 13% growth rate in coastal shipping movement during last two years as compared to growth of 4% in the preceding years[5].

However, the vast potential of coastal shipping is yet to be fully realized, and a more focused approach is required to realize this potential. This section focuses on the issues impending the growth of coastal shipping in India and provides actionable solutions to promote coastal shipping in the country. A root cause assessment of the individual cost components including the first mile costs, last mile costs, handling costs, port charges, voyage costs, etc. has been undertaken to identify key issues making coastal shipping not attractive. Additionally, other areas such as commodity specific prerequisites (lead time concerns, handling damage concerns, and cargo agglomeration) and present processes impacting ease of doing coastal movement have also been analyzed to comprehensively identify the root causes and suggest interventions for realization of the coastal movement for each commodity group.

2.2.1 Food Grains

Food Corporation of India (FCI) is the largest aggregator and distributor of food grains in India, primarily using railway (in break bulk form) for transportation of food grains. Road transport is mainly used in intra-state movement and for movement to regions not connected by rail. FCI has explored feasibility of moving through coastal mode to Kerala, North East, Lakshadweep islands and Andaman and Nicobar Islands, although the share of this movement has been quite low.

Exhibit 2.1 | Potential routes for coastal shipping of food grain



#	Representative stretch	Distance coastal (km)	Distance by Rail (km)
1	Firozpur Cantt – Deendayal – New Mangalore Port (Karnataka)	~ 2,800	~ 2,400
2	Ambala Cantt – Deendayal – New Mangalore Port(Karnataka)	~ 2,900	~ 2,400
3	Vijayawada - Visakapatnam – V.O.Chidambaranar (Tamil Nadu)	~ 1,750	~ 1,000
4	Firozpur Cantt – Deendayal – V.O.Chidambaranar (Tamil Nadu)	~ 3,700	~ 3,200
5	Ambala Cantt – Deendayal – V.O.Chidambaranar (Tamil Nadu)	~ 3,700	~ 3,000
6	Raipur – Visakhapatnam – New Mangalore Port(Karnataka)	~ 2,800	~ 1,700
7	Firozpur Cantt – Deendayal – Cochin Port(Kerala)	~ 3,200	~ 2,900
8	Ambala Cantt - Deendayal – Cochin Port(Kerala)	~ 3,500	~ 2,800
9	Vijayawada JN – Visakhapatnam – Cochin Port(Kerala)	~ 2,800	~ 2,400
10	Uttar Pradesh - Visakhapatnam Port – New Mangalore Port(Karnataka)	~ 3,600	~ 2,350
11	Madhya Pradesh – Deendayal – V.O.Chidambaranar (Tamil Nadu)	~ 3,500	~ 2,000

Source – Draft National Logistics Policy

5 Ministry of Ports, Shipping and Waterways Annual Reports

The existing rail movement of FCI from North India (Punjab/Haryana) to coastal districts of Maharashtra, Karnataka, Kerala and Tamil Nadu may have potential for conversion to a multimodal (Rail-Coastal) route through bringing the food-grains up to Gujarat ports (e.g. Deendayal port) via Rail mode and onward journey to end-destination in coastal districts through coastal mode. In addition, rail movement of food-grains from Andhra Pradesh to Kerala, Tamil Nadu and West Bengal may also have potential for conversion to coastal mode (Exhibit 2.1).

Considering the increase in number of handlings for multimodal coastal movement and possible risk of pilferage, the movement in containerized form becomes important for enabling a modal shift. Presently, FCI moves food grains in break bulk form in covered wagons and has storage depots both at origin and destination points. The multimodal coastal movement in containers would eliminate the need for establishing additional offices at intermediate handling points (such as at origin ports) and coastal movement can be undertaken without any significant institutional changes in FCI. Some of the private players, for example, ITC[6], are already moving food grains from Deendayal to Cochin on coastal mode in containerized form. The provisioning of door-to-door logistics through an integrated service provider would be required to reduce any additional efforts on part of cargo owners to undertake coastal movement.

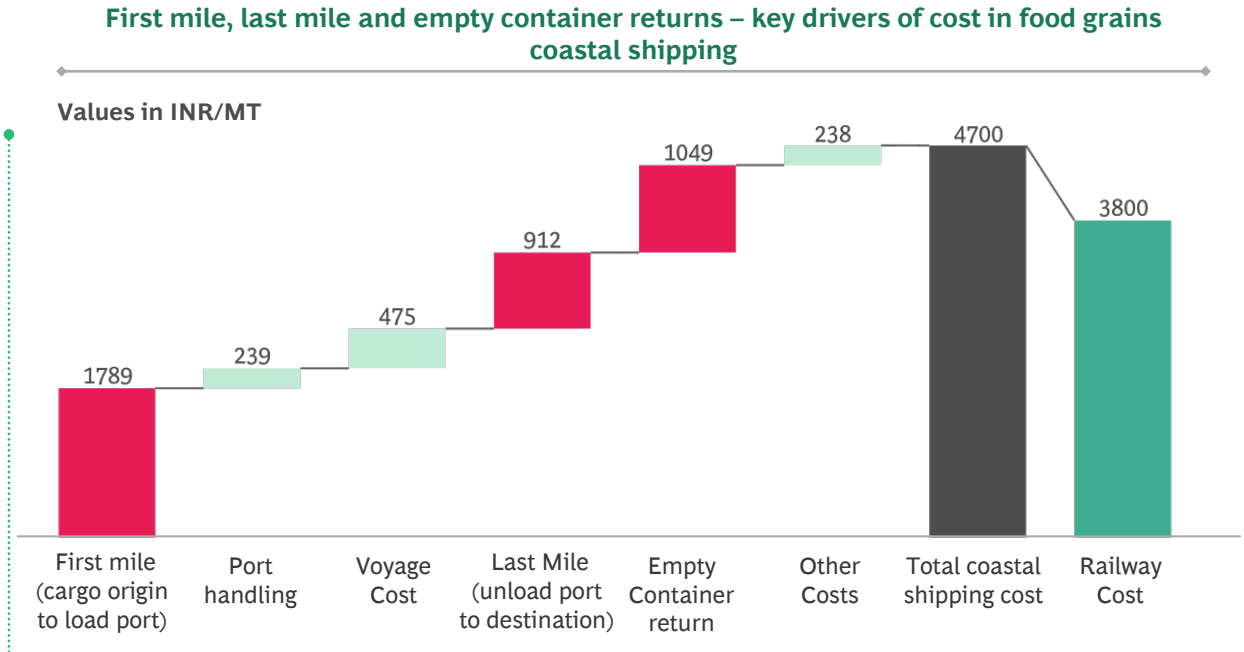
Total Logistics Cost (TLC) analysis for key OD pairs indicates that the coastal shipping costs with existing set-up of FCI depots exceeds the railways cost for key OD pairs (Exhibit 2.2). Key challenges across different legs of transportation are:

1. High first mile / last mile costs: Rail shed are co-located or within 5-10 kms from grain depots whereas container ICDs or port locations are ~50-200 Kms away
2. Empty domestic containers: Limited availability of return cargo necessitates repositioning of empty containers to origin location, thus constituting approx. 22% of overall costs

Initiative 2.1: Establish food grain depots near 6 ports in coordination with FCI

Indian Ports should develop food grain depots or warehouses to remove last mile movement inef-

Exhibit 2.2 | Key cost drivers in food grains coastal shipping



Source: ADB's Action plan for promotion of coastal shipping in India, 2019

6 ADB's Action plan for promotion of coastal shipping in India, 2019

ficiencies and reduce transportation costs. Analysis of FCI food grain storage capacity in coastal states of Karnataka, Kerala and Tamil Nadu suggests that FCI has storage capacity shortage in ~25 coastal districts in these three states (Exhibit 2.3).

Ports to drive consultations with FCI to set up new depots near port in districts as identified below:

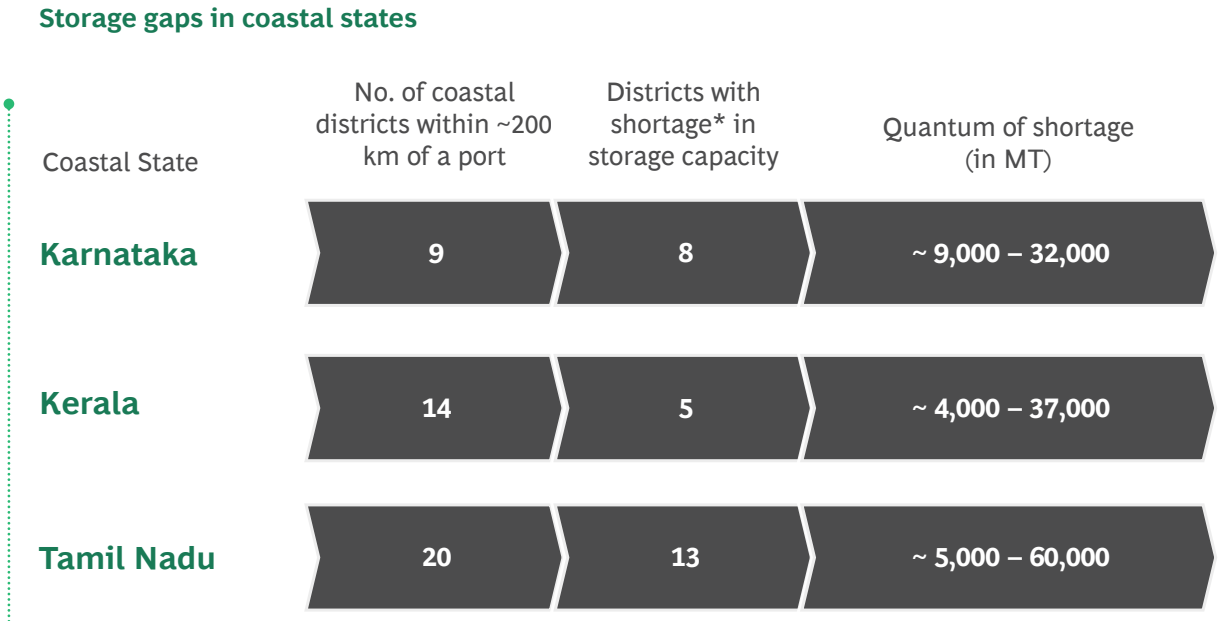
SI No.	Location of warehouses near Port/coastal berth	Coastal districts in proximity	Coastal traffic FY25 (Monthly in Mt)	Port based warehousing capacity required by FY25(MT)
1	NMPT	Shimga, Udpi, Chikamagalur, Hassan, Kodagu etc.	43,000	172,000
2	Cochin	Alappuzha, Idduki, Kottayam, Ernakulam etc.	47,000	187,000
3	V.O.Chidambaranar	Kanyakumari, Thoothukudi, Tirunelveli	16,500	66,000
4	Karaikal	Ariyalur, Nagapattinam, Perambalur etc	20,000	79,000
5	Chennai	Chennai, Kanchipuram, Tiruvallur etc.	24,0000	96,000
6	Mormugao	Belgaum, Uttar Kannada, Dharwad	38,000	154,000
	Total		188,000	754,000

In addition, empty container repositioning costs can be optimized by allowing use of EXIM containers for coastal movement. EXIM containers can move to nearest ICD / port after unloading domestic cargo for further EXIM use.

2.2.2 Coal

Movement of coal in India is majorly done through rail. Majority of the coal moving through coastal mode is loaded at Paradip Port, Haldia and Vishakapatnam Ports. This coal is primarily unloaded at Krishnapatnam Port, Kamarajar Port, and V.O.Chidambaranar Port from where it is moved to power plants in the hinterland.

Exhibit 2.3 | Storage gaps in coastal states for Food grains



* Storage requirement estimated assuming stock requirement of 4 times the demand in the district as per FCI norms
Source: ADB's Action plan for promotion of coastal shipping in India, 2019

The power plants in Andhra Pradesh and Tamil Nadu have linkages with MCL mines which are located in close proximity to Paradip port, providing opportunities for coastal shipment. While most of the Southern states are already using coastal mode for transportation of coal, there is significant potential for additional coastal movement of coal for plants based in Gujarat and Maharashtra.

TLC assessment for coastal movement of thermal coal to power plants in Gujarat, Maharashtra and other coastal states (except plants where coastal movement is already operational) comes out to be higher than railways cost with current mine linkage situation (Exhibit 2.4). Higher costs are primarily led by two-leg rail transportation from and to the port. Differential pricing structure for coastal cargo by railways can help cost economics and drive import substitution.

Initiative 2.2: Push for implementation of port connectivity projects (e.g. mine to port via rail) and drive coastal coal adoption at Western ports

Rail capacity augmentation on both Eastern and Western coast is required to drive adoption of coastal shipping for coal. Ministry of Ports, Shipping and Waterways need to drive joint discussions with Ministry of Railways and ensure accelerated implementation of following projects[7]:

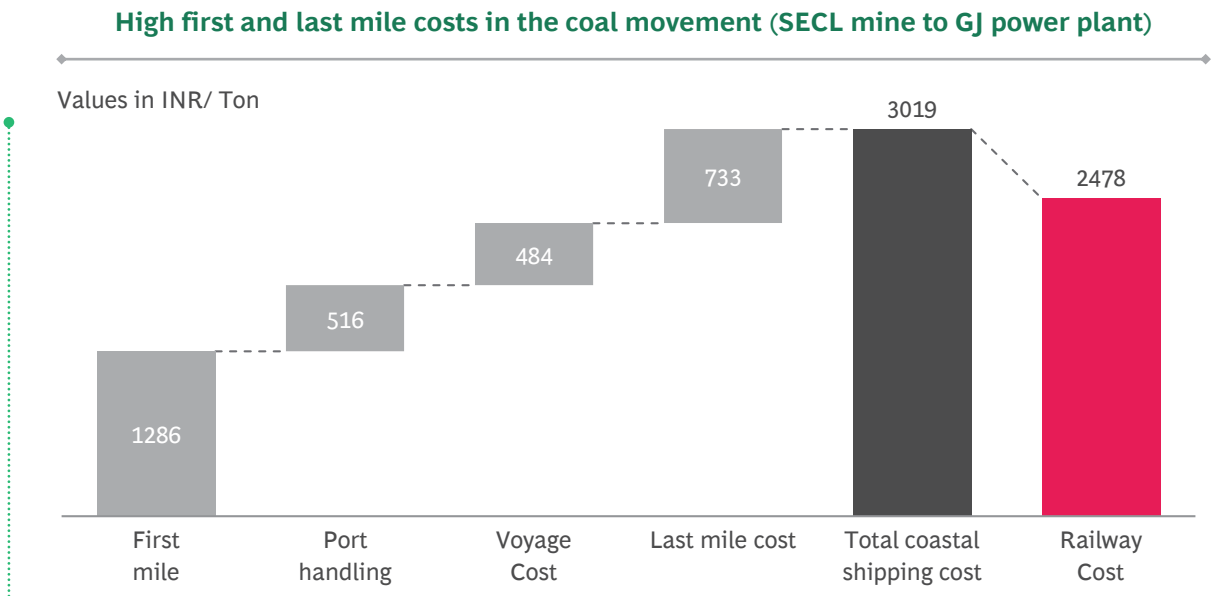
1. Talcher to East Coast Ports rail connectivity:
   - New Line from Haridaspur - Paradip (82 km)
   - New Line from Angul - Sukhinda road (99 km)
   - Budhapank - Salegaon via Rajathgarh (3rd and 4th Lane)
   - Third lane from Bhadrak – Nergundi
2. West Coast ports to Gujarat power plants' rail connectivity:
   - Development of railway sidings at Hazira Port

2.2.3 Cement

The cement plants are fairly spread out across India servicing the close-by markets. Majority of cement is transported through road, accounting for ~65% of total movement. All the large players have multiple plants to service the different regions which indicates the need to establish plants close to consumption centers, while simultaneously ensuring proximity to limestone reserves or thermal power plants to ensure proximity to raw material.

Currently, coastal shipping contributes only ~2% in total movement of cement. The coastal movement is primarily limited to large players possessing captive loading jetties with silo infrastructure to opti-

Exhibit 2.4 | key cost drivers in coal coastal shipping



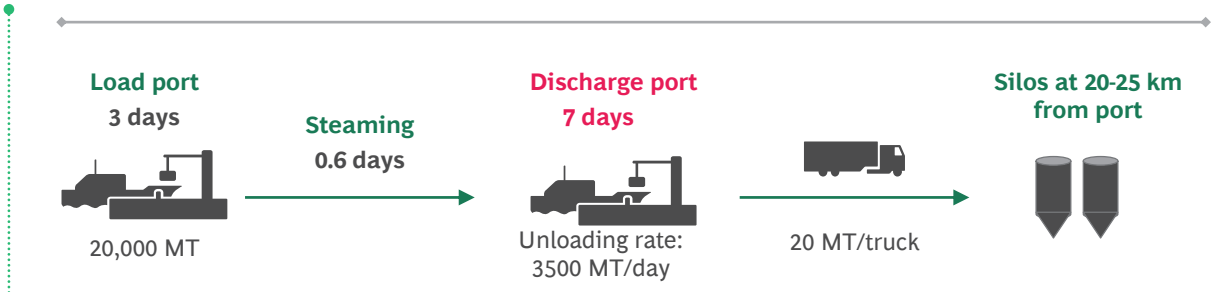
Note: Cost economics work better if the coal movement is from MCL mine rather than SECL mine
Source: Discussions with Ports, ADB's Action plan for promotion of Coastal Shipping in India, 2019

7 ADB's Action plan for promotion of coastal shipping in India, 2019; Detailed discussions with Ministry of Railways required to prioritize key projects

mize the costs through bulk movement of cement.

Unavailability of grinding unit/silos infrastructure at the port increases coastal shipping costs (Exhibit 2.5), primary because of high first mile costs and vessel related costs. Cement silo infrastructure needs to be introduced at ports. For instance, silo-cement infrastructure has been established at Penna Cement Terminal in Cochin port to cater cement from Krishnapatnam port.

Exhibit 2.5 | Higher time spent by vessel due to lack of silo infrastructure at discharge port



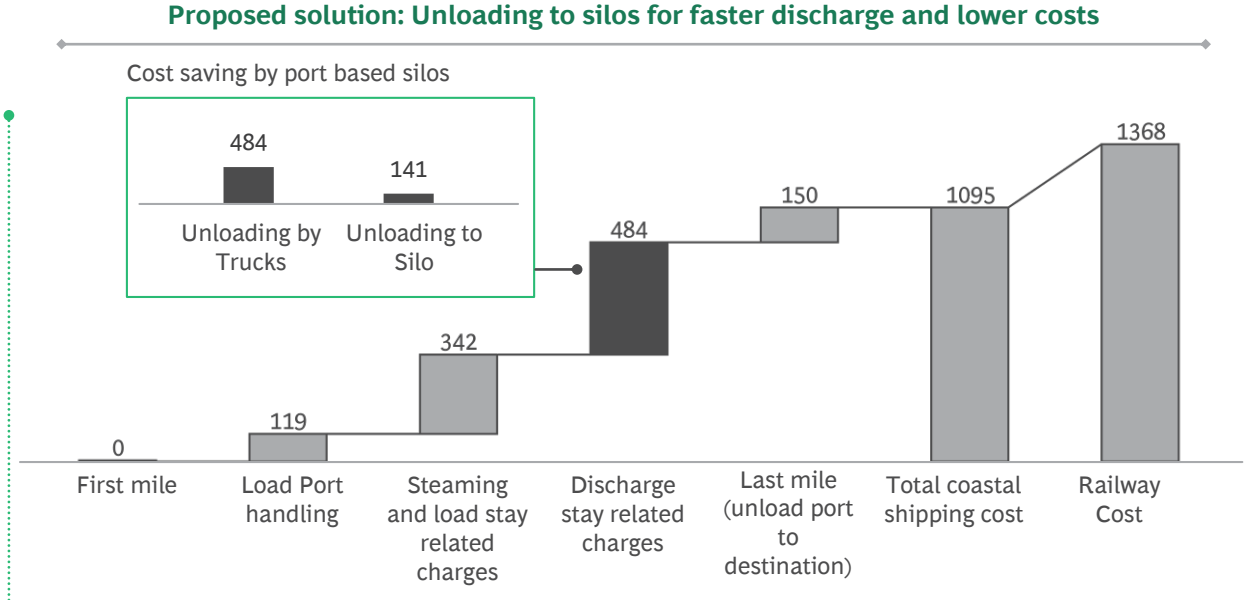
Source: Thrust area discussions

Initiative 2.3: Build silo infrastructure to improve coastal vessel turnaround time at targeted ports and drive additional cement coastal demand

Indian Ports to develop port-based silos to reduce the inefficiency in cement handling at Ports. Vessels can use port-based silos to load / unload the cement, instead of unloading the cement directly from bulk carrier trucks. The silos can further transport cement to trucks, without the need of vessel staying at berth for the duration.

Creation of silos increases the discharge rate from 3500 MT/ day to 12000 MT/ day, reduces time by 5+ days, releases vessel earlier and makes berth available at ports (Exhibit 2.6).

Exhibit 2.6 | Unloading to silos for faster discharge and lower costs



Above analysis is for JNPT to Pipavav; Values in INR/Ton

Source: ADB's Action plan for promotion of coastal shipping in India, 2019

Hence, silo infrastructure should be evaluated for development at select ports as below:

1. Orissa (Gopalpur / Paradip / Dhamra) and Haldia – cargo from Southern region cement players (Krishna and Ariyalur cluster)
2. Mumbai / JNPT – cargo from Gujarat cement players
3. New Mangalore – cargo from Maharashtra cement players (Gujarat cement players, Krishna region cement, etc.)

2.2.4 Petroleum, Oil and Lubricants (POL)

Pipeline is the cheapest mode of transport and dominates distribution of crude and POL products in the country. On the other hand, railway and transit by road primarily serve the requirements of the landlocked states. With current demand-supply scenario, it is expected that further modal shift to coastal shipping will be limited.

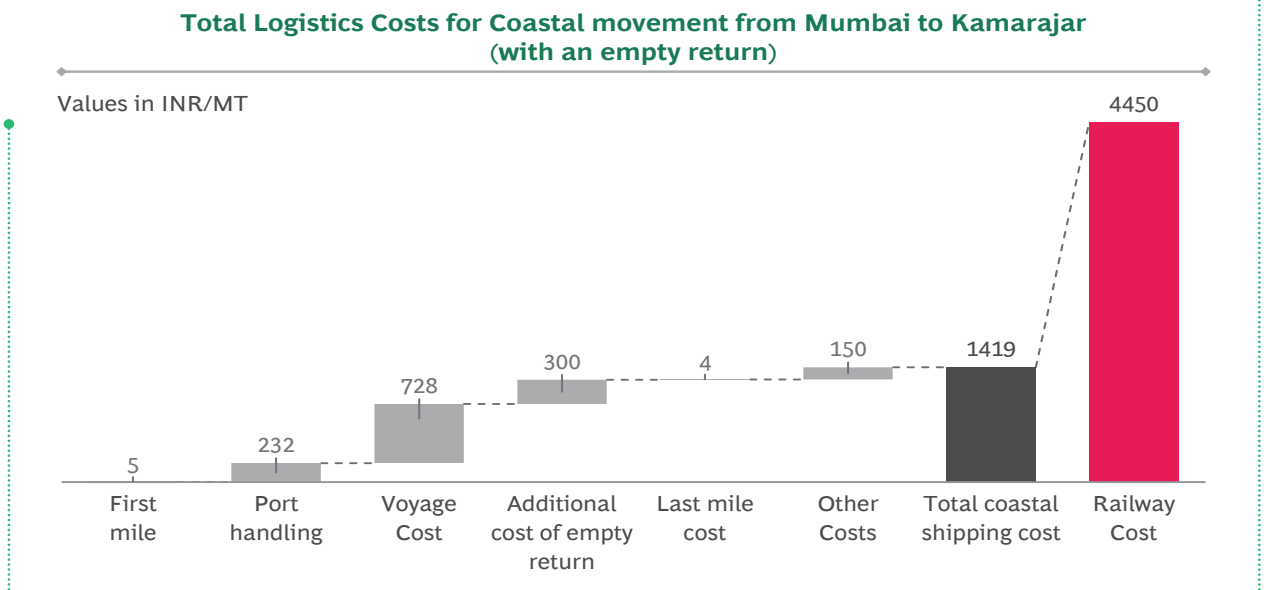
Coastal shipping mode is widely used for transportation of POL products currently. The TLC for multimodal coastal shipping comes out to be ~50-60% cheaper than the railways cost for potential future routes (Exhibit 2.7). Most of liquid berths at major ports are running at high capacity utilization. Indian ports need to have sufficient handling infrastructure and capacities to handle the additional coastal POL potential.

Initiative 2.4: Drive infrastructure readiness to support POL coastal shipping growth by 2030

It is imperative to ensure that evacuation and handling infrastructure capacity does not become a major constraint for coastal transportation of POL. Therefore, handling capacities at key destination ports need to be augmented as follows:

Port	Current situation	Infrastructure requirement
SMP Kolkata Port	Served by a single storage tank at Budge mooring, this reduces capability of maintaining buffer stocks at port	Additional storage tank to improve storage capacity at SMP Kolkata Port
Vishakapatnam Port	Has three POL berths, all above 60% utilisation, and only one has a draft greater than 10 m.	Oil Refinery 1 and 2 berths to be deepened at Vishakapatnam port
Kamarajar Port	Port's single liquid berth had 80%+ utilisation in FY20. Additionally, product movement to Chennai port (2.3 MTPA) is being gradually shifted to Kamarajar	Expedite construction of 2 new berths, 3 MTPA Multi Liquid Terminal (INR 393 Cr.) and 3 MTPA IOCL captive jetty (INR 480 Cr.)

Exhibit 2.7 | TLC for POL Coastal movement from Mumbai to Kamarajar (with an empty return)



Source: ADB's Action plan for promotion of coastal shipping in India, 2019

2.2.5 Steel

Major long-haul movement of steel is between the steel production clusters in Eastern India to Western and Northern India's auto and capital goods production clusters, major cities and infrastructure project sites. The large players are predominantly using rail mode for long-haul distribution of steel products, even for the markets situated in proximity of the coast such as Mumbai and Ahmedabad. The small players, on the other hand, are using road mode even for long-haul distribution owing to their small parcel sizes.

The current coastal movement is primarily restricted to movement from Hazira to consumption centers of Maharashtra, Karnataka and Kerala. The overall modal share for steel industry (finished products) is thus skewed towards rail and road modes, indicating a potential to create multimodal solutions to enable shift to coastal mode.

Assessment of cost components of multimodal coastal shipping movement indicates that the higher costs are primarily on account of non-optimal utilization of vessels and inefficient last mile movement. The vessels remain underutilized because of small parcel sizes of individual players.

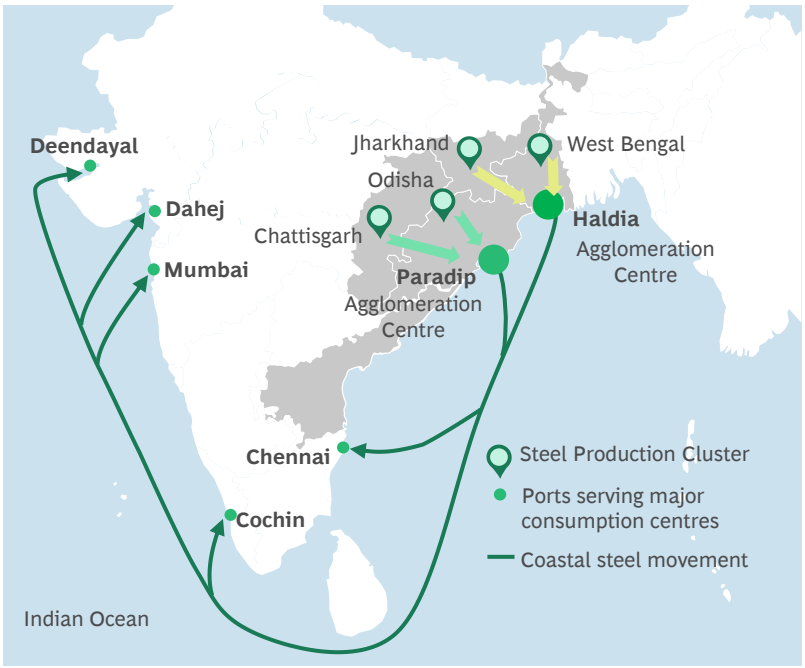
EXIM vessels calling at the east coast ports are mostly of Supramax (50,000+ DWT) and above size, however individual players' shipment size (5,000 MT to 20,000 MT) are not adequate to efficiently utilize these vessels.

Initiative 2.5: Develop coastal circuits for steel agglomeration center to drive growth of steel coastal cargo

The agglomeration of shipment quantities of different players can optimize Supramax vessel capacity utilization. The agglomeration centres need to be created near the load ports so that the parcel sizes of individual players can be aggregated for loading the vessels. Internationally, such agglomeration centres are a key part of the steel logistics infrastructure to optimize the logistics costs and increase market reach for the steel industry.

The centres would provide additional advantage of cost reduction through economies of scale in handling and storage of cargo and increased market access to small players who are forced to serve only the regional markets owing to small parcel sizes. Steel logistics agglomeration centres need to be prioritized near east coast ports of Paradip and Haldia as the eastern region provides the potential for coastal movement of steel (Exhibit 2.8).

Exhibit 2.8 | Way forward for Agglomeration centers



Source: ADB's Action plan for promotion of Coastal Shipping in India, 2019

2.2.6 Other Commodities

Coastal and inland waterways account for ~5% of the overall container movement in India as compared to 5-15% share of coastal transportation in container movement globally. Key issues in the growth of coastal shipment of containers in India are:

1. Lack of two-way traffic and low parcel sizes
   - One-way traffic and empty load returns lead to additional repositioning costs in overall coastal costs for shippers
   - ~25% of containers handled at Inland Container Depots (ICD) and Container Freight Stations (CFS) in India are empties[8]
2. Insufficient availability of containers
   - Insufficient availability of containers during peak season e.g. irregular availability of 40 ft. containers for cotton movement during Nov-Feb
3. Longer lead times and multiple handling
   - Longer transportation lead times than rail and road e.g. 12-15 days for movement of tiles from Gujarat to West Bengal vs. 6-7 days via road

This section focuses on two key commodities moving through containers in India:

Cotton:

Cotton is produced in about 10 states in India out of which two states – Gujarat and Maharashtra have a total production share of more than 50%. Coastal shipping opportunities exist in long-haul transportation of cotton primarily from production cluster of Gujarat to consumption centers in Tamil Nadu. Key challenges in coastal movement for cotton are:

- Small millers have small parcel sizes & do not prefer high lead times in coastal shipping (since it leads to inventory build-up & working capital tie-up)
- Irregular availability of 40 ft. containers & service during peak seasons (3 services/ week for Gujarat to Tamil Nadu currently)
- Just-in-time purchases by ginners (trucks can be positioned within 2 hours of deal fixation)

While the overall costs for coastal shipping is lower than rail, ports need to collaborate with shipping lines to improve container availability to drive adoption.

Ceramic Tiles:

India is the second largest ceramic tiles manufacturer in the world. Morbi in Gujarat contributes to about 90% of overall production in India. In addition to Morbi the key tile producing clusters are Thangarh (Gujarat), Himatnagar (Gujarat) and Virudhachalam (Tamil Nadu).

Coastal shipping has about 30–35% share in the overall transportation of tiles in India and caters to the demand from all the coastal states. Although the multimodal coastal movement cost is much cheaper than direct road or rail cost, the industry prefers road/rail due to lower lead times for end-to-end transportation. Key reasons for higher lead time in coastal movement are:

- Despite lower costs of coastal shipping, preference for roads due to lower lead times for end-to-end transportation
- Insufficient availability of containers during peak season and rakes for movement of cargo to load port
- High transportation time for coastal movement

Initiative 2.6: Drive coastal cargo adoption of Container cargo across major and minor ports

Possible interventions for increasing the adoption of coastal shipment for cotton and ceramic tiles:

1. Allow and drive use of EXIM containers for domestic coastal cargo to enable reduction of empty container repositioning costs and increase container availability on the route
2. Encourage logistics service providers to offer door-to-door services to help reduce dealing with multiple intermediaries
3. For Ceramic Tiles, establish linkage of industrial cluster with coastal movement (e.g. Morbi)

8 ADB's Action plan for promotion of coastal shipping in India, 2019

Information box 2.1

Port of Antwerp has established a dedicated cell and digital platform to drive intermodal shift. Key responsibilities of the cell include:

Dedicated cell that develops intermodal solutions for connectivity to hinterland (rail, road, barge)

Assess new target regions and builds tailored solutions for connectivity with the Port

Single point of contact & helpdesk for customers

Offers help on opportunities for cargo bundling

2.2.7 Coastal and Inland Cargo Demand Facilitation Centre

Global Ports have established a Coastal and Inland Cargo Demand Facilitation Centre to facilitate intermodal shift (Information Box 2.1).

Initiative 2.7: Establish a Coastal and Inland Cargo Facilitation Center (CCFC) under MoPSW to drive demand for coast cargo through outreach and collaborative planning

A 5 to 10-member team to be setup at Ministry of Ports, Shipping and Waterways for collaboration and outreach with select PSUs, trade associations, private players, ports and Rail/ road ministries. CCFC to facilitate discussions between private players and ports for building infrastructure related to coastal shipping (e.g. material handling / storage infra for coastal cargo). In addition to this, CCFC will also structure solutions for coastal cargo and facilitate demand as below:

- Solutions with matching return cargoes and consistency of volumes
- Cargo studies to generate demand, identify & create coastal circuits
- E-marketplace/ aggregation platform for coastal cargo

2.3 Improving Operational Efficiency and Evacuation

This section benchmarks operational performance of the 12 major ports with selected best-in-class international ports for identifying improvement areas.

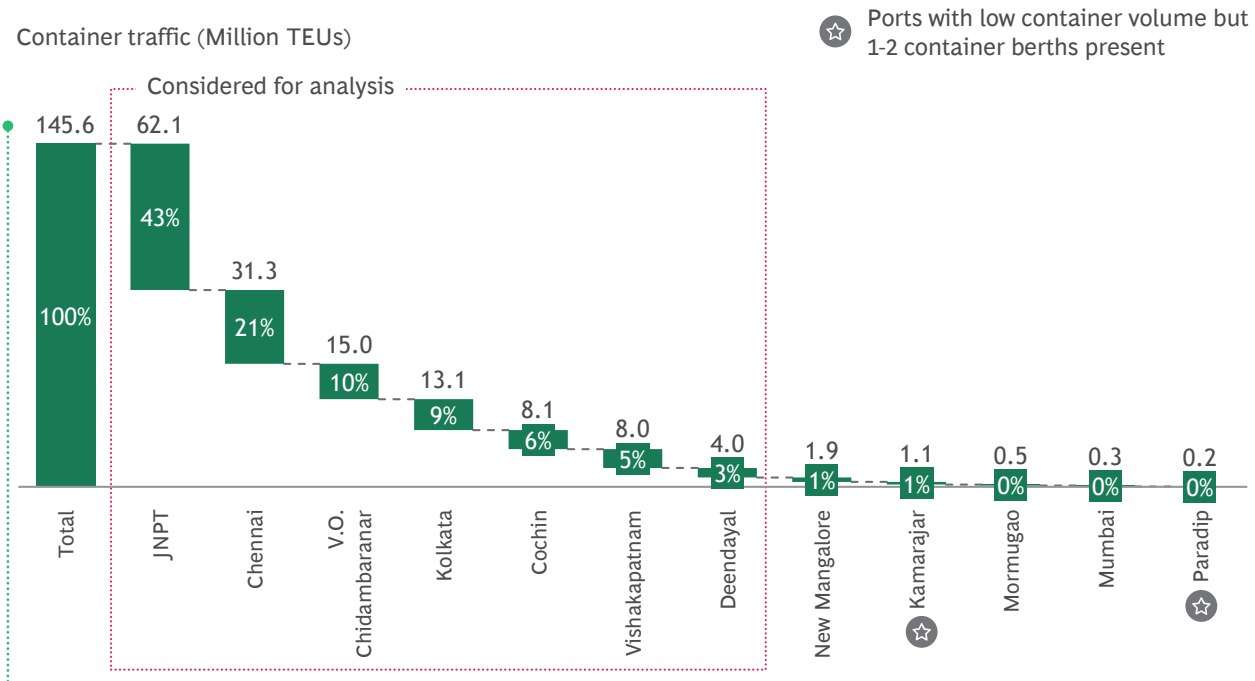
The benchmarking exercise covers both container and dry bulk terminals across all important aspects of port operations, i.e. marine operations, berth operations, yard management, storage and evacuation. While continous progress is made by Major Ports in last few years, significant potential exists to further improve operational efficiency at Major Ports.

2.3.1 Container Terminal Performance Improvement

In FY19, JNPT, Chennai, V.O. Chidambaranar, SMP Kolkata, Cochin, Vishakapatnam, and Deendayal ports handled ~98% of container traffic in India (Exhibit 2.9).

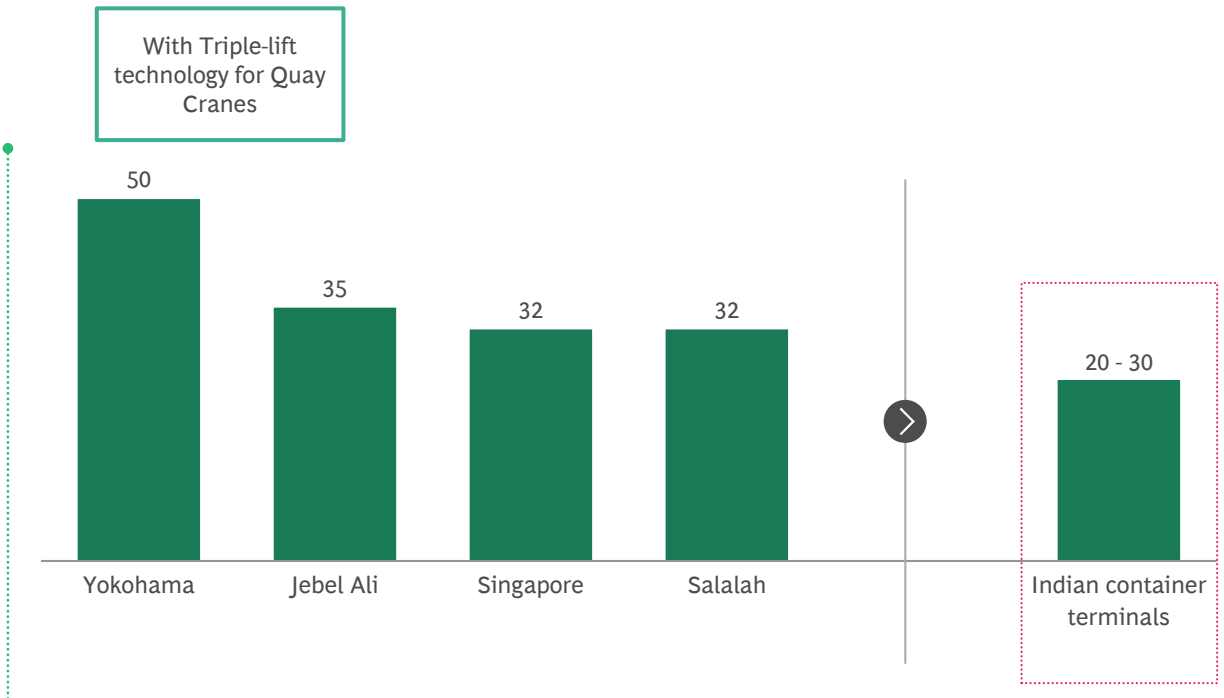
When benchmarked against the best-in-class ports, opportunity exists for Indian container terminals to improve productivity and reach world class levels, both in Quay Crane (QC) productivity and Rubber Tyre Gantry Crane (RTGC) productivity (Exhibit

Exhibit 2.9 | Container traffic (Million TEUs)



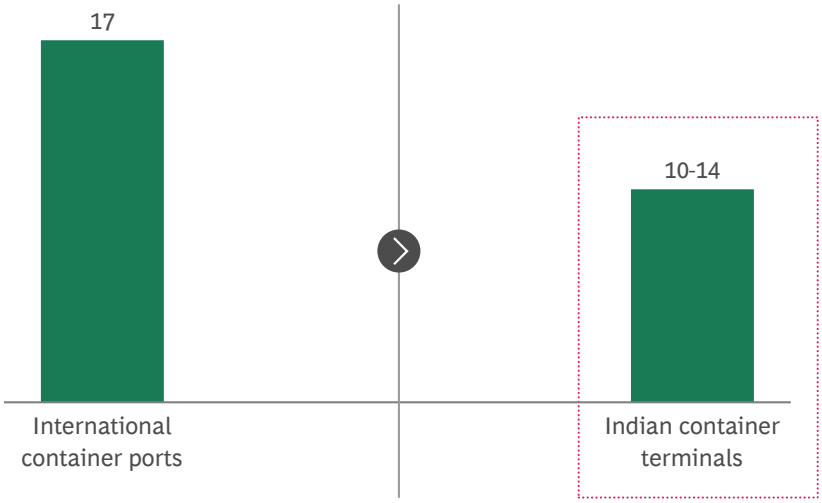
Source: IPA's Port statistics report, Discussion with Major ports

Exhibit 2.10 | FY20 Quay Crane productivity at container berths (moves/hour)



Source: IPA's Port statistics report, Discussion with Major ports

Exhibit 2.11 | FY20 RTGC productivity at container berths (moves/hour)



Source: IPA's Port statistics report, Discussion with Major ports

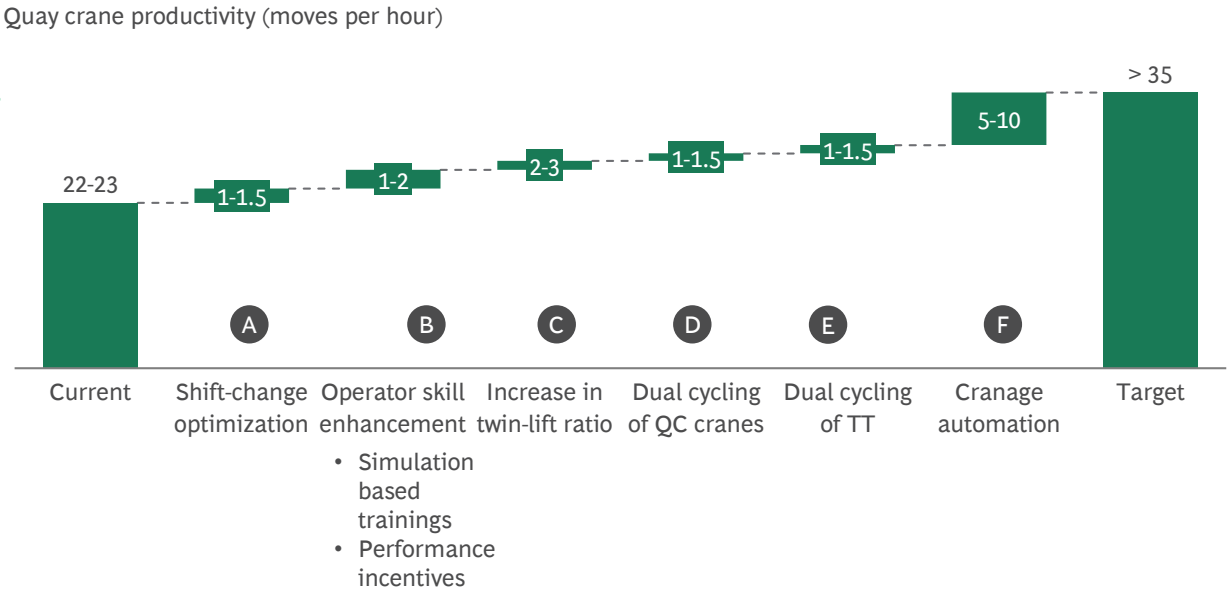
2.10-2.11).

Global ports focus on three key areas to drive best-in-class performance for container terminals

1. QC productivity enhancement :

Six key levers have been identified to improve Quay Crane productivity basis potential assessment for a container terminal (Exhibit 2.12). Each port to eval-

Exhibit 2.12 | Quay crane productivity enhancement



Source: IPA's Port statistics report, Discussion with Major ports

uate feasibility and potential for implementation of different productivity improvement levers as below:

A Shift-change optimization:

Productivity improvement is a function of net productivity during working time and non-working time. In the analysis of Non-working time, the largest delay was found to be on account of work stoppage during shift changes.

Best-in-class terminals handle shift changes in less than 10 mins and significant productivity drop occurs due to longer than scheduled shift changes (Exhibit 2.13).

Shift time loss can be reduced by optimized planning using three main levers:

- Advance deployment planning
  - ¬ Leave of employees can be communicated to the shift in-charge in advance
  - ¬ Schedule the reporting time of the second shift members at least 10 minutes before the first shift ends
  - ¬ Planning and deployment of employees can be ready before the second shift starts
- Introduce flexibility to handle delays
  - ¬ QC operator continues up to 30 minutes late if next driver is delayed
- Enforce rules for shift changes through supervision
  - ¬ Enforce system log-in/log-out rules
  - ¬ Track the actual time loss during shift change and the reasons

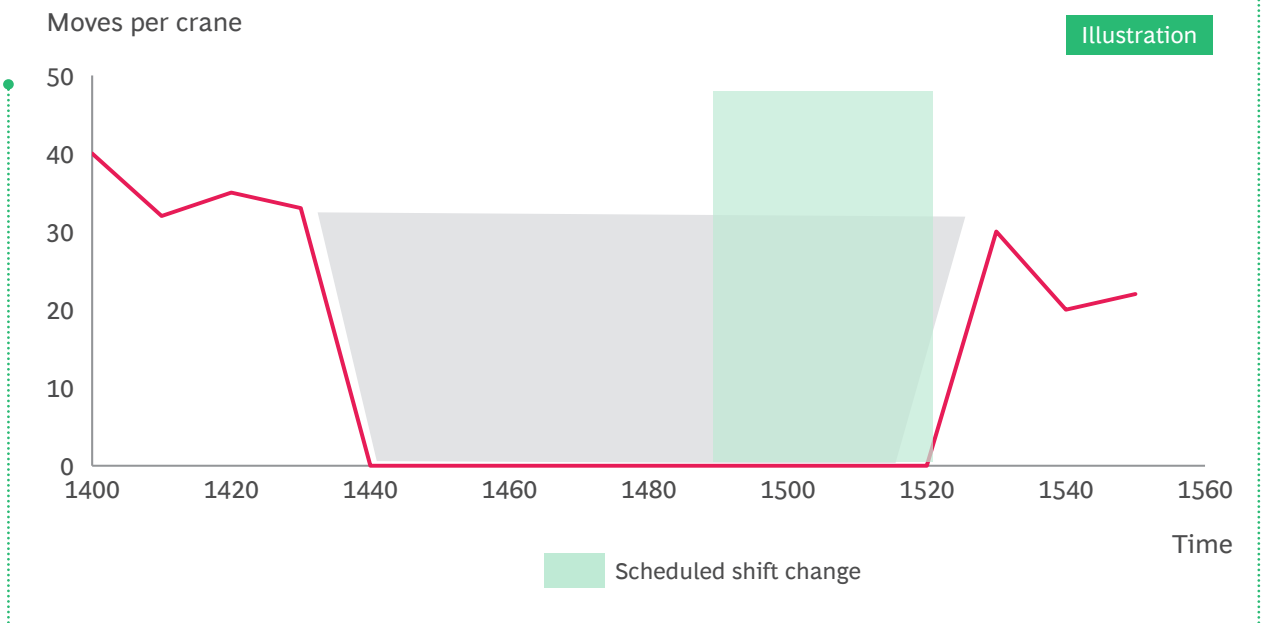
B Operator Skill Enhancement:

Individual performance is typically not tracked for crane operators and, hence, skill-based deployment is not feasible to optimize performance. Often, new operators can get assigned to QC operations without passing the required threshold moves per hour.

To address the skill gap, measures need to be taken to have a structured assessment of operator skills, design training and mentoring programs to improve individual performance, and up-skill under-performing operators. Leading terminal operators approach raising operator skills along four dimensions:

- Assessment – Annual or bi-annual assessment of QC operator skills
  - ¬ Assessments done throughout the year
  - ¬ Based on observations of actual cycle time
  - ¬ Only certified QC operator at defined moves per hour can start operation
- Focus – Assessment program must be focused on the low performing operators based on the previous month's performance record
- Customization – Customize training to the needs of each operator based on the assessment

Exhibit 2.13 | Productivity drop due to longer than scheduled shift changes



Source: Expert discussions

- ¬ Include “ride-along operators” with best-in-class operators
- ¬ Include regular feedback

- Incentivization – Integrating individual performance into incentive scheme to enable more direct link to terminal performance. Individual productivity targets should be established basis different equipment types to create an effective incentive scheme

C Increase in twin-lift ratio:

Twin lifts, i.e., lifting two 20-foot containers simultaneously, increases crane productivity by minimizing the total number of crane moves required for a given parcel size. Crane productivity is defined as container moves per hour; twin-lifts are counted as two moves when calculating crane productivity. Twin lifting can boost crane productivity for terminals where 20-foot container constitute a large share of traffic (60%-70%) e.g. JNPT and Chennai ports. Twin lifts can be maximized basis:

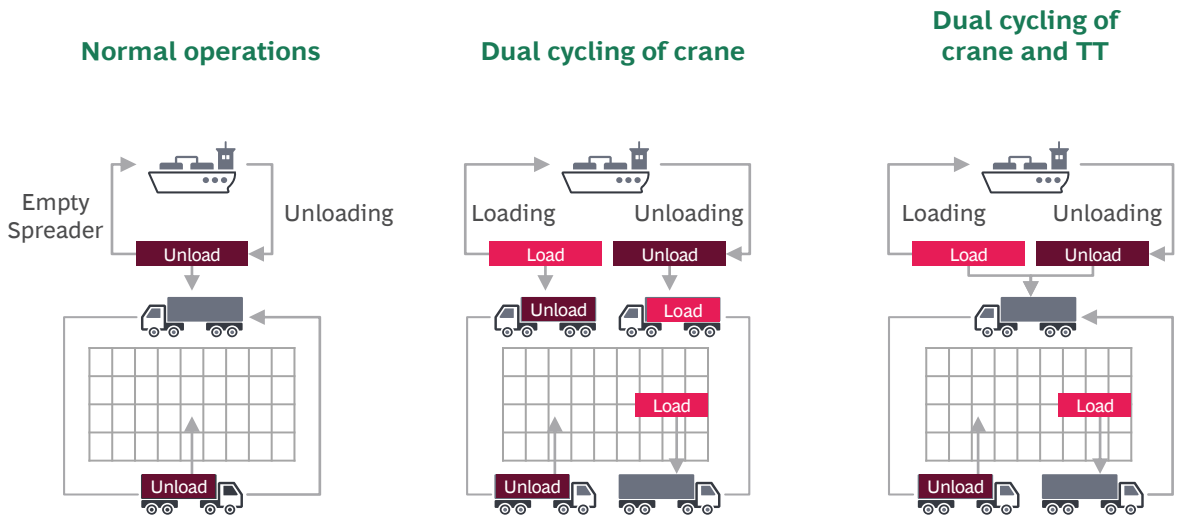
- Tracking / monitoring the twin-lift ratio
  - ¬ Track the actual twin-lifts by export / import vs. planned twin-opportunities
  - ¬ Conduct leakage analysis to identify root - causes of lost twin lift opportunities
- Ensuring yard plan adherence
  - ¬ Increase focus on the adherence to the yard plan i.e. whether export containers are dropped (by truck) at the correct location
  - ¬ Ensure yard inventory is correctly updated
  - ¬ Measure yard planning performance by tracking the adherence vs. plan
- Ensuring stowage planning maximizes twin-lifts

D & E Dual cycling of QC cranes and TT:

Dual cycling is a practice of doubling crane productivity through combining load and discharge into single crane movements to avoid wasted trips. A quay crane discharges an import container from ship to shore and places it on the terminal trailer. For the return movement to the ship, the crane lifts an export box placed ready on the berth and loads it onto the ship (Exhibit 2.14).

Dual cycling is used across a number of terminals globally (e.g. Busan (Korea), Shanghai, etc.) as a practice to improve productivity. It is especially conducive for gateway terminals with large parcel sizes. Large parcel sizes are able to optimize below the deck operations, maximizing the potential for dual cycling, which is not feasible below the deck. Homogenous bays of 20’ or 40’ containers make dual cycling more efficient as there is no time lost in adjusting the spreader width to different container sizes between two moves.

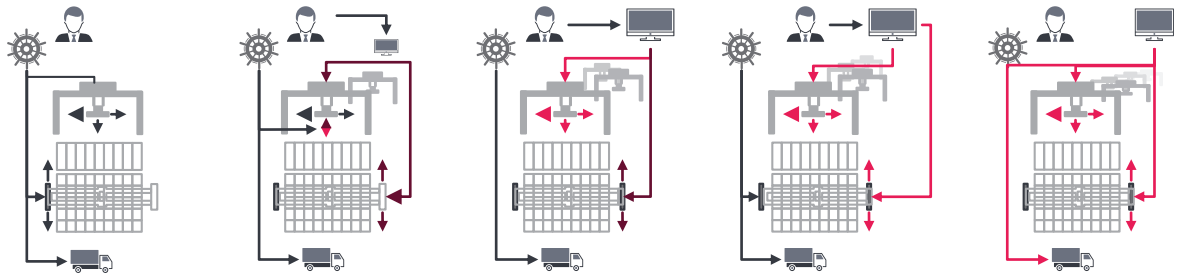
Exhibit 2.14 | Dual cycling of cranes and TT



Source: Expert discussions

Exhibit 2.15 | Levels of cranage automation

Remote control	Supervised automatic moves	Automatic pick and place on platforms	Automatic path and sway control	Fully automated
Operator controls all of the moves of the crane via onboard cameras and remote-control station	Operator supervises automated pick-up/set down of containers on platforms; controls operation in truck lane	Pick-up/set down of containers executed automatically; Operator controls operation in truck lane	Pick-up/set down of containers and sway control executed automatically; Operator controls operation in truck lane	Fully automated solution with automated container handling, min. path control & anti-collision; operator needed for exception handling only



— Remote controlled moves — Supervised moves — Automatic moves

Source: Expert discussions

The primary benefit of dual cycling is reduction in number of cycles required for a given parcel size. Productivity improvements of 10-40% are possible with dual cycling. Further, dual cycling of TTs can provide additional benefit of reducing trips between berth and yard. Reduction in TT trips required is possible by dual cycling of the truck. Up to 15% reduction in TTs per QC have been seen in some terminals.

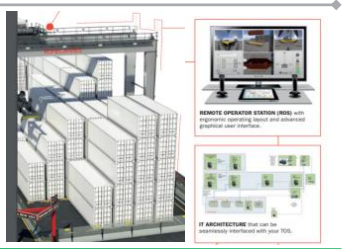
Information box 2.2

Dublin Port's adoption of AutoRTG system

2 RTGs operating as Automatic Gantry (Stage 4) with minimal supervision

AutoRTG software integrated with existing terminal operating system

Auto RTG crane with active load control and autosteering



Key benefits:

- GPS and video analytics enabled tracking to ensure each container is always in the right place at the right time
- Remote controlled operations driving less personnel requirement and operational cost optimization
- Enabled with advanced safety features like anti-collision software to reduce the incidences that can cause damage to equipment or containers
- Increased throughput predictability and improved service level to the ship owners

F **Cranage automation:**

Automated Quay Cranes (AQC) help in enhancing efficiency of operations and improving working conditions for crane operators. AQC systems allow part of the container moving process – from a vessel to an Automated Guided Vehicle (AGV) – to be done automatically, with exact positioning of a container onto the ship or a vehicle currently requiring remote control using a joystick. Multiple degrees of freedom can be automated in quay crane operations from remote control to fully automated operations (Exhibit 2.15).

2. Yard performance management :

Four global best practices have been identified to improve yard performance:

- **A** Ensuring yard integrity: Real-time container yard location update through hand-held Radio Data Terminals (RDTs)
- **B** Yard planning optimization: KPI establishment and rigorous management for yard planning (e.g., Load spread, measure execution of the plan)
- **C** Operator skills improvement: Structural assessment & training to operators; strong performance management systems in place
- **D** Equipment upgrade / addition: Automation of degree of control for RTGC's or addition of RTGCs through leasing (Information Box 2.2)

3. Evacuation efficiency improvement:

Five best-in-class levers have been identified to improve evacuation efficiency basis potential assessment for a container terminal (Exhibit 2.16). Each port to evaluate feasibility and potential for implementation of different evacuation efficiency levers as below:

Initiative 2.8: Improve terminal performance for all container terminals to achieve defined targets across ports

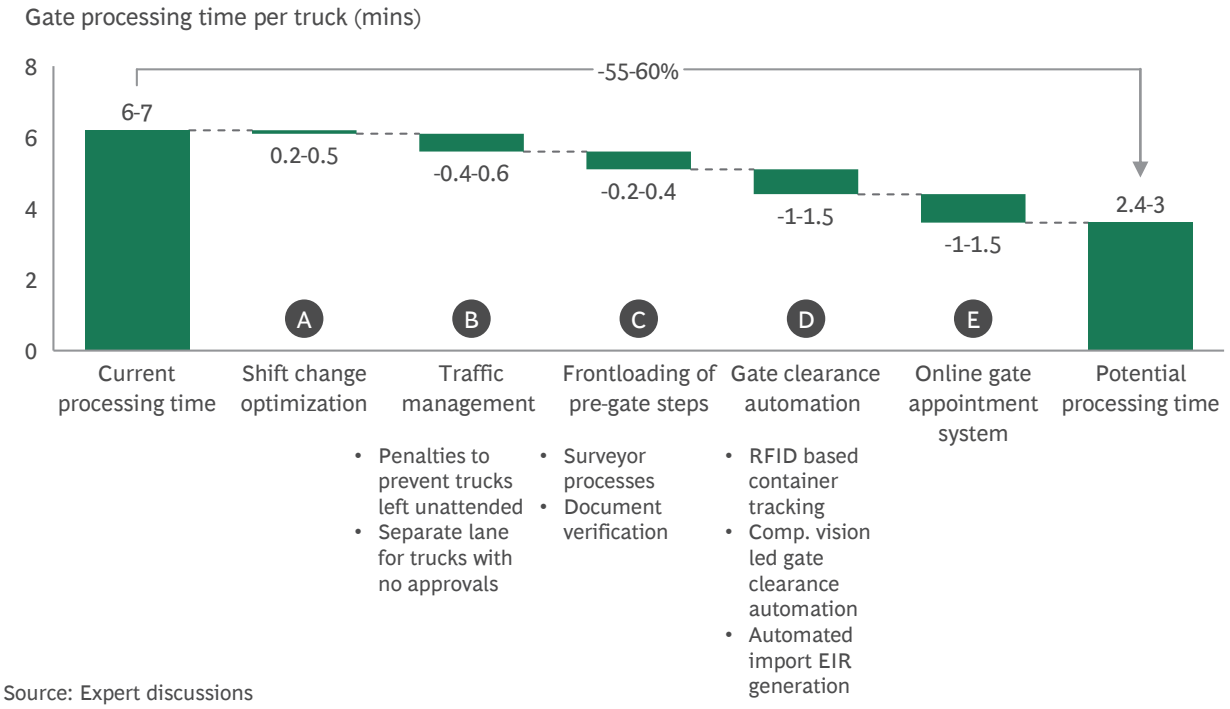
Best-in-class targets have been defined for Indian container terminals to deliver world class performance across the value chain.

Category	Key performance indicators	Unit	FY30 targets
Vessel turnaround	Avg. vessel turnaround time (TRT)	Hours	Less than 20[2]
Equipment productivity	Quay crane productivity[1]	Moves per hour	Greater than 35[3] For new equipment for upcoming PPP terminals: 50[3]
	RTG crane productivity	Moves per hour	Greater than 18[4]
Yard management	Yard integrity	%	99% and above
	Container dwell time	Hours	Less than 24 hours[5]
Evacuation	Avg. Truck TAT (w.r.t point X-10km out of port)[6]	Hours	Less than 3 hours
	Avg. Rake TAT	Hours	Less than 2 hours

1. QC productivity calculated with respect to working or operating time only–all non-working time excluded
2. Basis 4-5 best-in-class international container ports (e.g. Port of Singapore, Port of Jebel Ali, Port of Colombo) for mainline vessels; assumptions for normalization-package size of 2,000 TEU, QC productivity of 33 moves per hour, 3 QC employed per vessel, 4 hours of non-working time due to customs rummaging, pilotage, repos of containers
3. Basis QC performance across 4-5 best-in-class international container ports (e.g. Port of Jebel Ali, Port of Yokohama, and Port of Singapore); For new installations / replacements with triple-lift technology
4. Basis RTG cranes performance across 4-5 best-in-class international container ports (e.g. Port of Jebel Ali, Singapore, etc.); assuming 2 RTGCs per crane for vessel operations (1 RTGC for yard operation)
5. Basis Maritime Vision target of "One day Cargo clearance/evacuation"
6. Truck TAT to be measured from and to Point X (defined as a fixed point 10 Kms outside of port)

Source: Discussion with Major ports, Expert discussions

Exhibit 2.16 | Evacuation efficiency of container terminals



Source: Expert discussions

2.3.2 Dry Bulk Terminal Performance Improvement

In FY19, Paradip, Vishakapatnam, Deendayal, SMP Kolkata, Kamarajar, V.O. Chidambaranar, Mumbai, Mormugao, and New Mangalore ports handled ~98% of dry bulk traffic in India (Exhibit 2.17). When benchmarked against the best-in-class ports, there exists a significant opportunity exists for Indian dry bulk terminals to improve berth productivity (both mechanized and conventional) and reach world class levels (Exhibit 2.18).

Global ports focus on two key areas to drive best-in-class performance for dry bulk terminals:

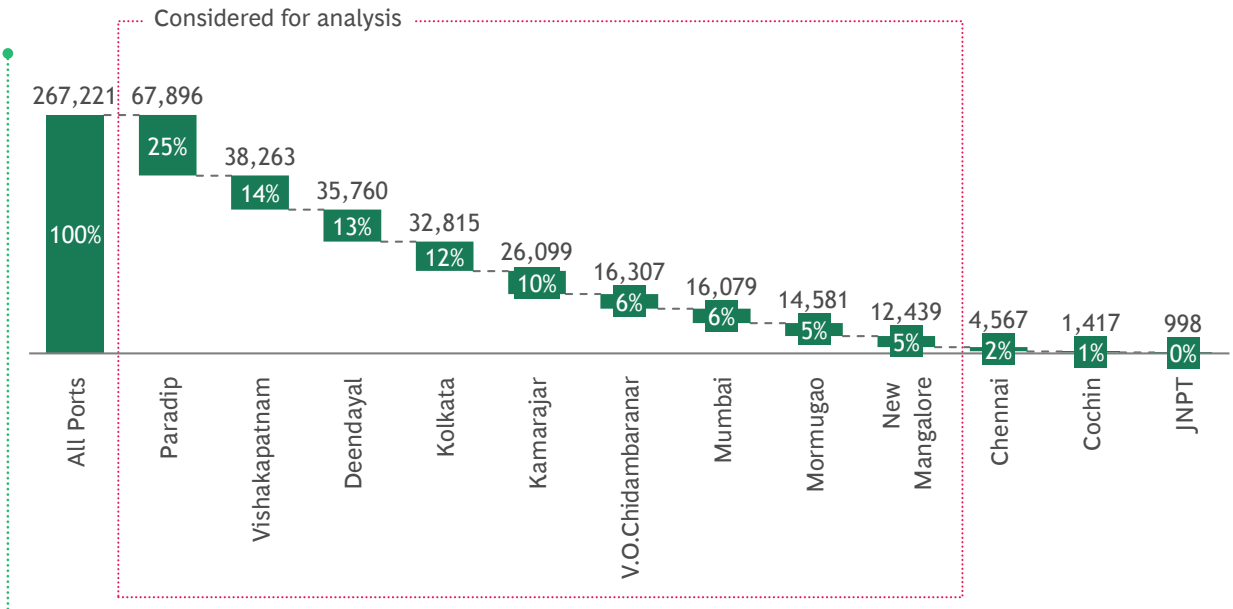
1. Standardized operating norms for all berth activities:

Leveraging best-in-class practices, Indian Ports need to define operations and performance norms for dry bulk terminals e.g. number of hatch changes, number of draught checks, etc. (Exhibit 2.19)

In order to derive the productivity norms, following steps need to be undertaken:

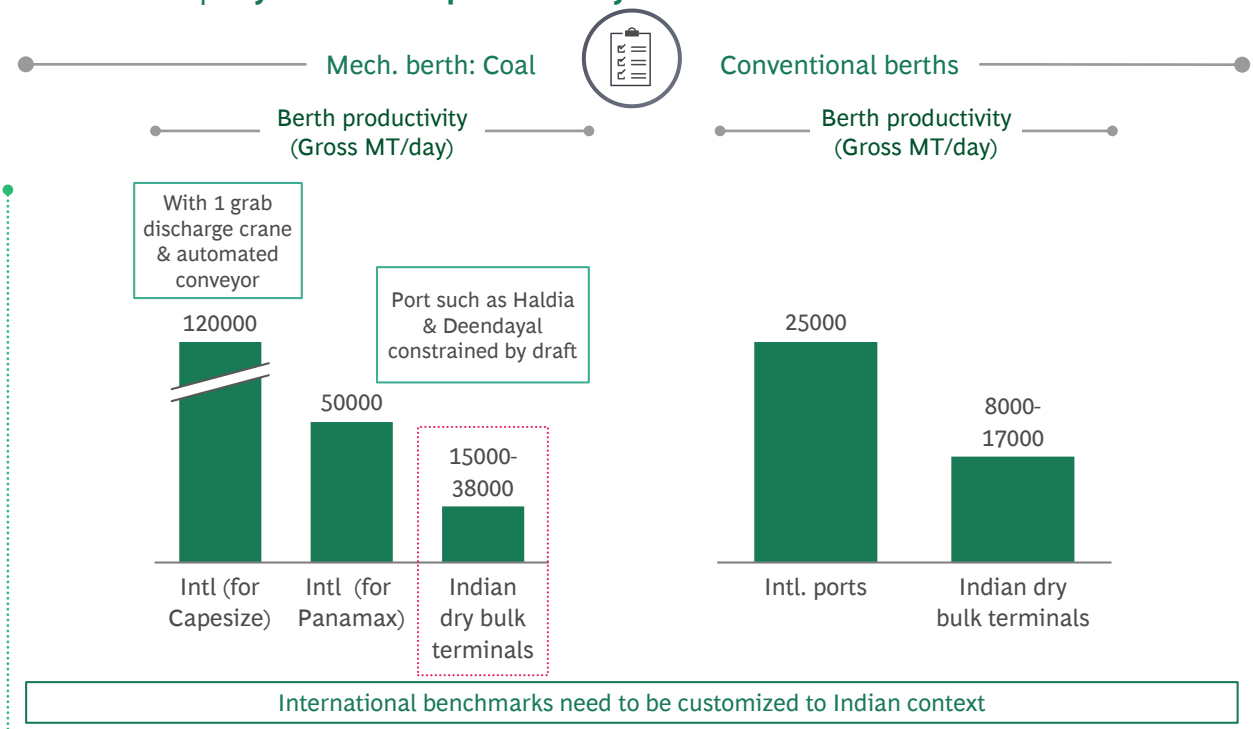
- Norms to be devised in alignment with all maritime stakeholders (Ports, FAS, etc.)
- Norms to be finalized for each port basis best-in-class practices as well as port-specific on-ground factors
- Norms need to be updated every 2-3 years to achieve best-possible performance at berth

Exhibit 2.17 | Dry bulk traffic handled (MTPA)



Source: IPA's Port statistics report, Discussion with Major ports

Exhibit 2.18 | Dry bulk Berth productivity



Source: IPA's Port statistics report, Discussion with Major ports

2. Optimization of non working time at berth

Four best in class practices have been identified for optimization of non working hours at berth:

A. Haul-in-haul out optimization: Additional waiting space inside the dock, tugs within dock, etc. to ensure immediate hauling of vessels

B. Hatch sequence streamlining: Submission of loading sequence before berthing for optimization and reduction in distance travelled by loader

C. Hot seat change institutionalization: Institutionalizing hot seat changes for crane operators to minimize idle time during shift changeover

D. Equipment preventive maintenance: Preventive (predictive wherever possible) maintenance of equipment such as idlers, stackers, etc.

Initiative 2.9: Improve berth productivity for dry bulk terminals through berth operating norms and non-working time optimization levers to achieve defined targets across ports

Best-in-class targets have been defined for Indian dry bulk terminals to deliver world class performance across the value chain.

Individual ports to define roadmap for achieving identified targets per current baseline and other factors.

Category	Key performance indicators	Unit	FY30 targets
Vessel turnaround	Avg. Panamax turnaround time (TRT)	Hours	36[1]
	Avg. Capesize turnaround time (TRT)	Hours	45[2]
Equipment productivity	Berth productivity – Conv.	Gross MT/day	~25,000
	Coal berth productivity – Panamax (for imports) – Mech.	Gross MT/day	~50,000[3]
	Coal berth productivity – Capesize (for imports) – Mech.	Gross MT/day	~120,000[3]
	Iron ore berth productivity (for exports) –Mech.	Gross MT/day	~44,000[4]
Yard management	Avg. cargo wait time for rake	Hours	Less than 5 hours
Evacuation	Avg. Truck TAT (w.r.t point X-10km out of port)[6]	Hours	Less than 3 hours
	Avg. Rake TAT	Hours	4 to 5

Equipment productivity metrics to be finalized for each port keeping port context in consideration

1. Panamax capable berth handling parcel size of ~55,000 MT. At panamax parcel size, loading time would be ~30 hours. Additional PBD + other non working time = ~6 hours
2. Capesize capable berth handling parcel size of ~66,000 MT. At panamax parcel size, loading time would be ~36 hours. Additional PBD + other non working time = ~9 hours
3. Basis coal berth productivity for best-in-class bulk handling ports such as Port of Houston, Port of Detroit, Richard's Bay, Mundra, etc.
4. Basis iron ore berth productivity for best-in-class bulk handling ports such as Saldanha Bay, Port Elizabeth, and Richards Bay, etc.
5. Truck TAT to be measured from and to Point X (defined as a fixed point 10 Kms outside of port

Source: Discussions with Major ports, Expert discussions

Exhibit 2.19 | Berth operating norms guidelines (illustrative)

Illustrative

		Mechanized Operations	Conventional Operations
Loading operations	Working Time	Optimal Working time = F(Optimal Vessel size, Optimal productivity) • Vessel size = F(Berth draft, Length) • Optimal productivity = 70-80% of rated equipment capacity	Optimal Working time = F(Optimal Vessel size, Optimal productivity) • Vessel size = F(Berth draft, Length) • Optimal productivity = F(Crane moves, grab size, Cargo density, Crane capacity)
	Non-working Time	Non-working time = F(no. of hatches, time per hatch, no. of trim passes, no. of draft checks, etc.) • Customized norms for each port basis on-ground labor related time losses, weather related time losses, etc.	
Unloading operations	Working Time	Optimal Working time = F(Optimal Vessel size, Optimal productivity, Vessel quantity) • Vessel size = F(Berth draft, Length) • Optimal productivity = 70-80% of rated eqpt. cap. when vessel quantity > 50% • Optimal productivity = 40-50% of rated eqpt. cap. when vessel quantity < 50%	Optimal Working time = F(Optimal Vessel size, Optimal productivity, Vessel quantity) • Vessel size = F(Berth draft, Length) • Optimal productivity = F(Crane moves, grab size, Cargo density, Crane capacity, Vessel quantity) • HMC optimal productivity for different cargo to be customized basis on-ground factors across ports
	Non-working Time	Non-working time = f(no. of hatches, time per hatch, no. of trim passes, no. of draft checks, etc.) • Customized norms for each port basis on-ground labor related time losses, weather related time losses, etc.	

Source: Expert discussions

2.3.3 Port Connectivity

Port connectivity is one of the critical enablers for ports driving E2E effectiveness of the logistics system. Connectivity challenges exist in India impacting ports' turnaround times and India's trade competitiveness. The key challenges are underleveraging of domestic waterways, constrained rail infrastructure along key routes, connectivity to west coast ports through the Western Ghats, and last mile connectivity to ports and key industrial hinterlands.

Railways is the mainstay for carrying long lead distance and bulk cargo. Most of the routes carrying bulk cargo (like thermal coal) are running at high utilisation. There is also an issue of constrained infrastructure between receiving ports and demand centres especially around the Western Ghats. Western DFC with linkages to ports of Deendayal, JNPT, Hazira and Mundra through spur lines can result in modal shift from road to rail for containers generated in the northern hinterland.

Road is economical compared to rail for covering distances up to 500 to 1,000 km from the port, however the current condition of highway stretches is inconsistent. To make roads more effective as a mode of cargo movement, Government of India has envisioned the construction of four lane road across the entire coastline.

Freight transportation by waterways is highly underutilized in India as compared other advanced maritime nations. National Waterways 1, 2, 4 and 5 can be further developed to play an important role in cargo movement.

Initiative 2.10: Accelerate implementation of prioritized multi-modal connectivity projects (across all modes –rail, road, coastal and inland waterways) to ports

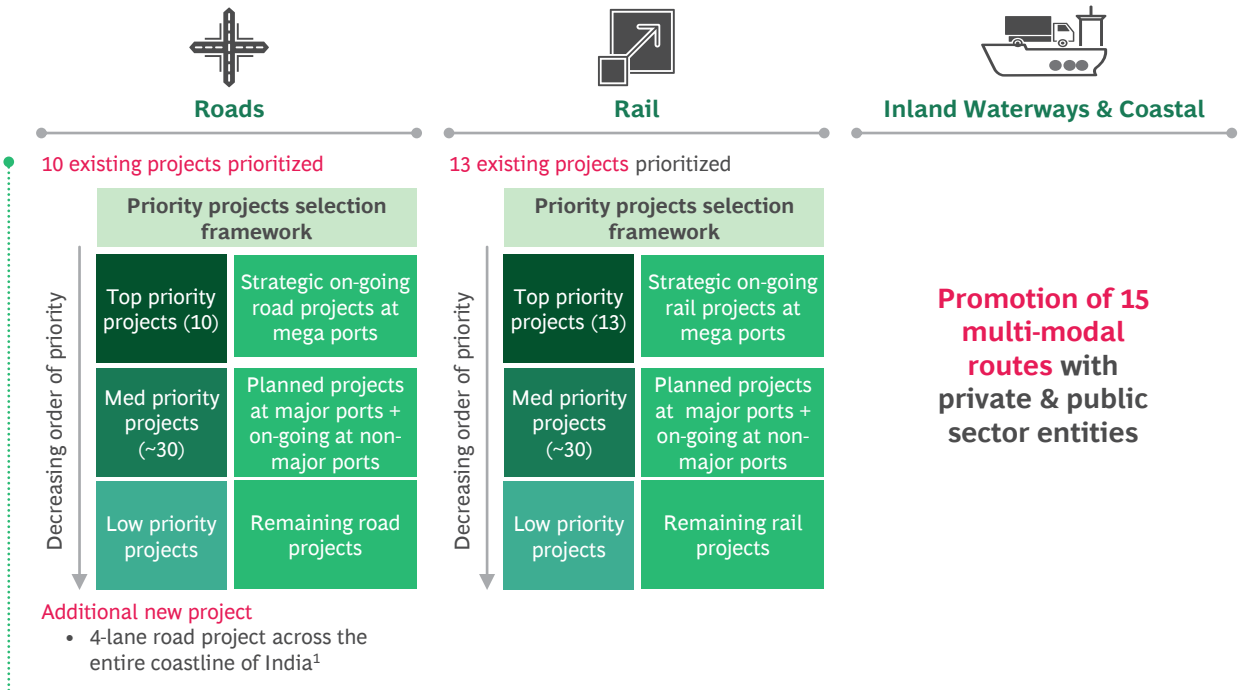
Thrust area discussions have resulted in formulation of priority projects selection framework to prioritize and accelerate implementation of connectivity projects across rail, road, inland waterways and coastal shipping (Exhibit 2.20).

Road connectivity:

10 existing road projects along with four-lane coastline road project (undertaken by Government of India) have been identified as top priority projects. In addition, spur lines from trunk infrastructure need to be developed in phases

- Phase 1: Mega ports (Vadhavan-JNPT, Paradip, and Deendayal)
- Phase 2: Other Major ports and Non-Major ports

Exhibit 2.20 | Port Connectivity projects prioritization



Note: 1- PM's speech on Independence day 2. 1 Pipeline project also prioritized 3. 1 MMLP project also prioritized
Source: Press search, Sagarmala, Port strategy documents, MoRTH, IWAI inputs

Rail connectivity:

13 existing rail projects have been identified as top priority projects across following areas

- Rail line upgradation
- Rail connectivity to port
- Rail connectivity within port

Ports to work with central and state bodies (Ministry of Railways (MoR), National Highway Authority of India (NHAI), Indian Port Rail and Ropeway Corporation Limited (IPRCL), etc.) to drive accelerated implementation of top priority projects (Exhibit 2.21).

Inland waterway routes:

23 multi-modal routes have been prioritized for promotion with private & public sector entities (Exhibit 2.22).

Exhibit 2.21 | List of priority connectivity projects

Priority projects

Road

- Expressway from Sanathnagar industrial cluster -Hyderabad to JNPT
- Expressway from Dighi Industrial Cluster -Pune to JNPT
- JNPT - 6 to 8 laning of NH-4B- SH-54 and Amra Marg
- 6 laning of Pune-Satara section of NH 4
- 2 to 4 laning of Panvel to Indapur section of NH 17 - Phase 3
- Elevated road from Chennai port to Maduravoyal through NHAI
- Works for four laning of road from Hassan to BC. Road at NMPT
- Road improvement work from Vallur Junction to Port Main Gate at KPL Port
- Northern Port Access Road for a length of 20.90 km with 3.70 km SPUR Road is a part of Chennai Peripheral Ring Road(CPRR) at KPL Port
- Four lane connectivity road at MPT port

Rail

- Third line from Sukhinda Road to Jakhapura
- New Line from Haridaspur to Paradip
- New Line from Angul to Sukhinda
- 3rd and 4th line from Budhapank- Salegaon via Rajatgarh
- Doubling of line from Sambalpur to Talcher
- Doubling of line from Titlagarh to Sambalpur
- Bhadrak - Nergundi 3rd Line
- 3rd &4th line between Jarapaada - Budhapank with flyover at Talcher
- 3rd line rail connectivty from Jasai to JNPT
- Upgradation of existing railway lines at DPT and rail connectivity from berth #13 to 16
- Development of DFC compliant rail yard at JNPT
- Laying of additional railway line which is parallel to existing single connectivity at KPI Port
- Doubling from Hassan to Mangaluru including a tunnel of 55 km at NMPT
- Pipeline: Pipeline from Paradip to Hyderabad
- MMLP: Multi Modal Logistics Park at Paradip Port

Note: List of projects needs to be further discussed with each port trust and other key stakeholders for final priority list
Note: 1. Gray line items are identified from Sagarmala list of projects
2. Line items in red as identified per discussions with Ports
Source: Sagarmala, Port Strategy documents

Exhibit 2.22 | IWs priority routes

Source: Report by IWAI

2.3.4 Ancillary Services

Best-in-class ports provide multiple ancillary services for cargo and mainliners to improve port performance (Information box 2.3). Indian ports to establish selected cargo and ship related ancillary services basis commodity profile and business objectives.

1. Cold storage and Agri infrastructure:

Global ports have strengthened warehousing & cold storage facilities to improve port competitiveness. For example, Port of Rotterdam has established an entire Agri industrial park to push its agriculture exports. Industrial park has also attracted complimentary testing laboratories and logistics service providers offices and incentivized Agri bulk producers to setup nearby sites such as World flour, ADM, Codrico, etc.

India's agriculture export is one of untapped sectors and it holds immense potential for further development. Considering the huge potential in this sector, Government of India has conceived a forward looking "Agro Export Policy – 2018". This policy envisages to aggressively promote the Agri Exports in next 10 years trade.

Three types of storage categories are required to handle different Agri export commodities:

- Cold storage – Approx. 4.5 lakh Sqm area requirement expected; primarily for perishable products e.g. fruits, fish, etc.
- Warehouse – Approx. 2.5 lakh Sqm area requirement expected; primarily for non-perishable products
- Open spaces

2. Participating Government Agencies (PGAs):

Participating Government Agencies (PGAs) are the allied agencies that are required to examine and provide clearance to certain types/ categories of cargo. These include Food Safety & Standards Authority of India (FSSAI), Controller of Drugs, Animal Quarantine, Plant Quarantine, Wildlife Crime Control Bureau (WCCB) etc.

Indian Ports need to facilitate allotment of space within/near ports to PGAs for clearance / approvals time reduction. For example, JNPT has allotted office space/ land to all the PGAs resulting in saving of at least 24 hours for both importers and exporters.

Information box 2.3

Common services

- Bunkering services for sea-going & inland vessels
- Fire protection services
- Warehousing and cold storage facilities
- Towage services
- Pilotage services
- Tug services
- Documentation clearance services
- Ship chandling and anchorage services

Differentiated services

- Ballasting / De-ballasting services
- Shipbuilding, maintenance & repair services
- Stock management services e.g. packaging, labelling, etc.
- Container washing services
- Testing services
- Crew change services
- Port reception facilities
- Electricity supply services
- Crane rental services
- Premium Barging Service
- Waste reception facilities

Initiative 2.11: Deploy commodity-specific ancillary services & facilities (such as faster food testing by FSSAI) at ports

1. Cold Storage Infrastructure for Agri Exports:

Indian Ports need to drive targeted cold storage infrastructure program basis:

- Cargo profile at port (current and near-term future)
- Inefficiencies and gaps in existing infrastructure
- Availability of land
- Impact on logistics costs (storage, handling)

Ancillary infrastructure strengthening to be aligned with proposed industrial cluster and MMLP establishment plans of each port. Following steps to be undertaken by Ports:

- JNPT, Deendayal & Vishakhapatnam ports (handing ~75% of Agri exports) to upgrade from current warehouses to cold storage and reefer facilities
- All ports to study conversion of current open yard spaces in Grade A type warehouse infrastructure
- Ports to look for development of integrated warehousing facilities through PPP model

2. Participating Government Agencies (PGAs):

PGA's to have integrated offices in the port/port vicinity to streamline interaction between the importers / custom agents and the PGAs. Indian Ports to reduce clearance / approvals time by establishing nodal offices of PGAs within/near ports as follows:

- The PGAs needs to be profiled and set up as per cargo profile, geographical location and relevance at the ports (both Major and Non-major ports)
- Land allotment, allocation of nodal officers and possession of space by PGA's need to be re-examined and necessary action should be taken to revive stalled initiatives
- Real time monitoring facilities for testing reports to be established

2.4 Reducing Cost of Doing Business (CoDB)

India has larger hinterland distances as well as higher unit freight costs than other developed

countries impacting logistics in the country. Indian road freight cost[9] is INR 2.3 per ton per KM, as compared to INR 1.7-1.9 per ton per KM in other advanced maritime nations.

Mapping of E2E logistics costs for imports and exports or Cost of Doing Business (CoDB) indicates Port's contribution to be approx. 10-20% of the overall costs for both containers and dry bulk traffic (Exhibit 2.23-2.24)

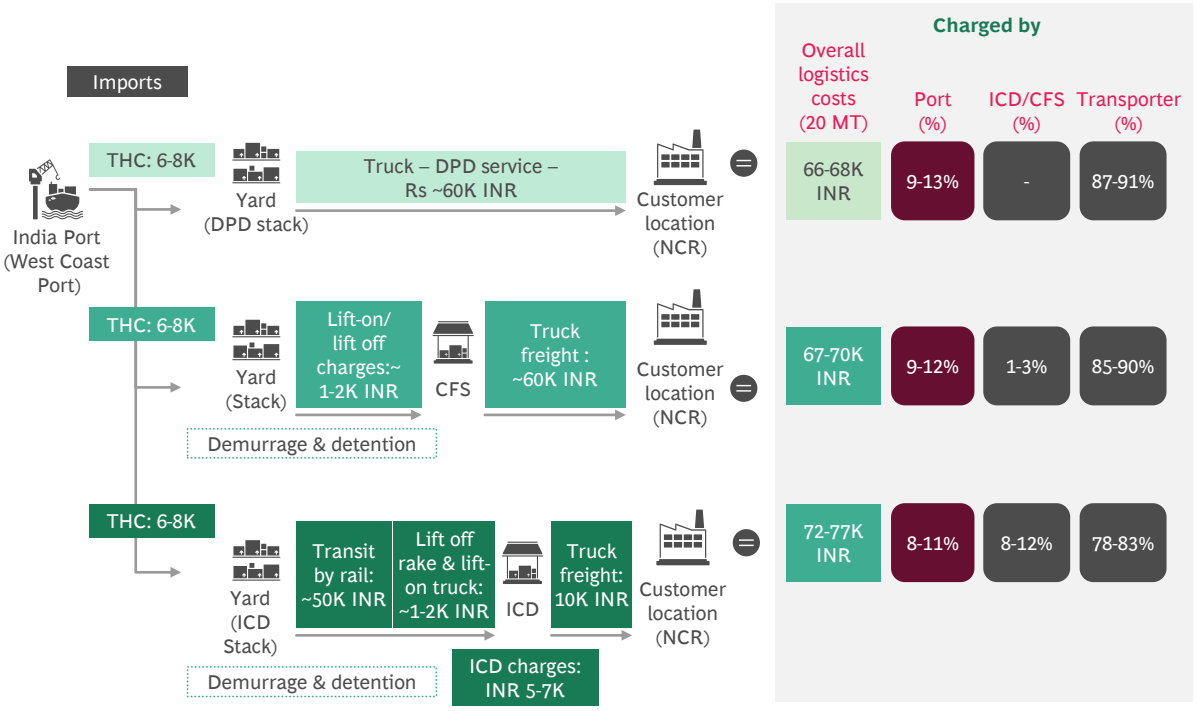
Following three factors primarily contribute to high CoDB in India:

- Cost plus margin for Vessel Related Charges (VRCs) at ports – Higher underlying costs translate to higher charges
- Excess personnel or manpower costs at ports
- Limited revenue sources for ports currently to offset high-cost base

2.4.1 Vessel Related Charges (VRCs) Reduction

As compared to leading container ports in South Asia region, Major ports have 3-6X higher container VRCs primarily due to high underlying costs and currently followed cost-plus margin model under Tariff Authority for Major Ports (TAMP) (Exhibit 2.25).

Exhibit 2.23 | E2E EXIM logistics costs for containers

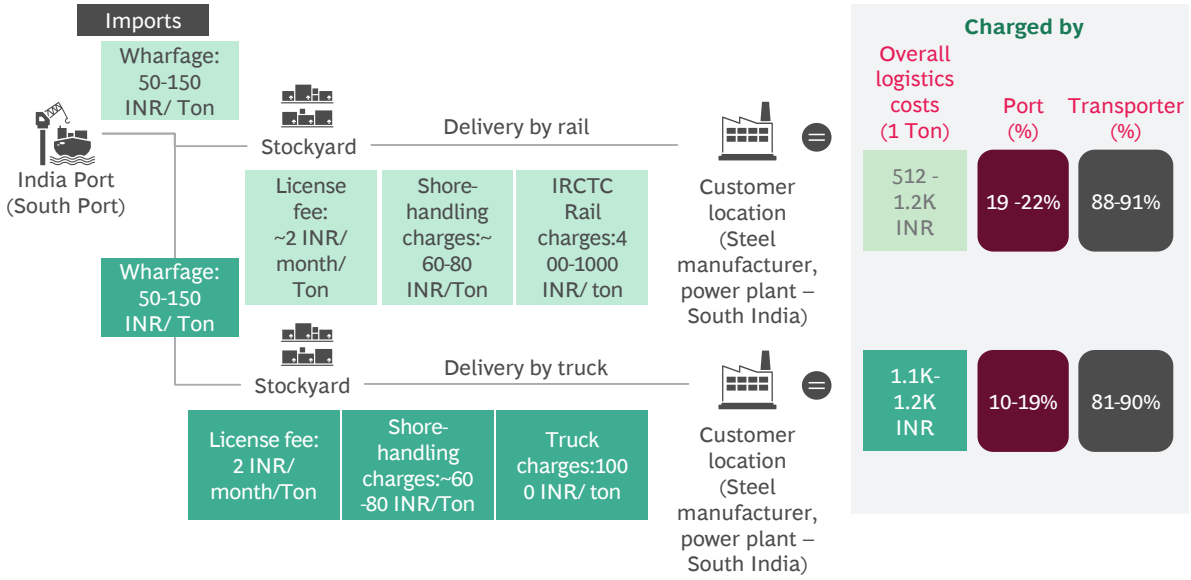


Note:
1. Above costs are for a 20ft. container
2. Dwell time charges for containers stored in port premises (~250-300 INR) for 4-15 days is applicable in stretch case
3. Ground rent charges by CFS on loaded containers (4-7th days at Rs 42 per TEU)
4. Terminal handling charges vary periodically (above values are as on Jan'20)
5. Customs charges (Bill of entry charge, documentation & clearance charges) range between ~2.8-4.5K INR, demurrage and detention charges have been excluded from above analysis
6. Additional charges by freight forwarders range between 4-5K INR and have been excluded from above representation
7. Exports costs structure follows similar pattern as imports

Source: Secondary research, interviews with industry experts, TAMP

9 Expert discussions

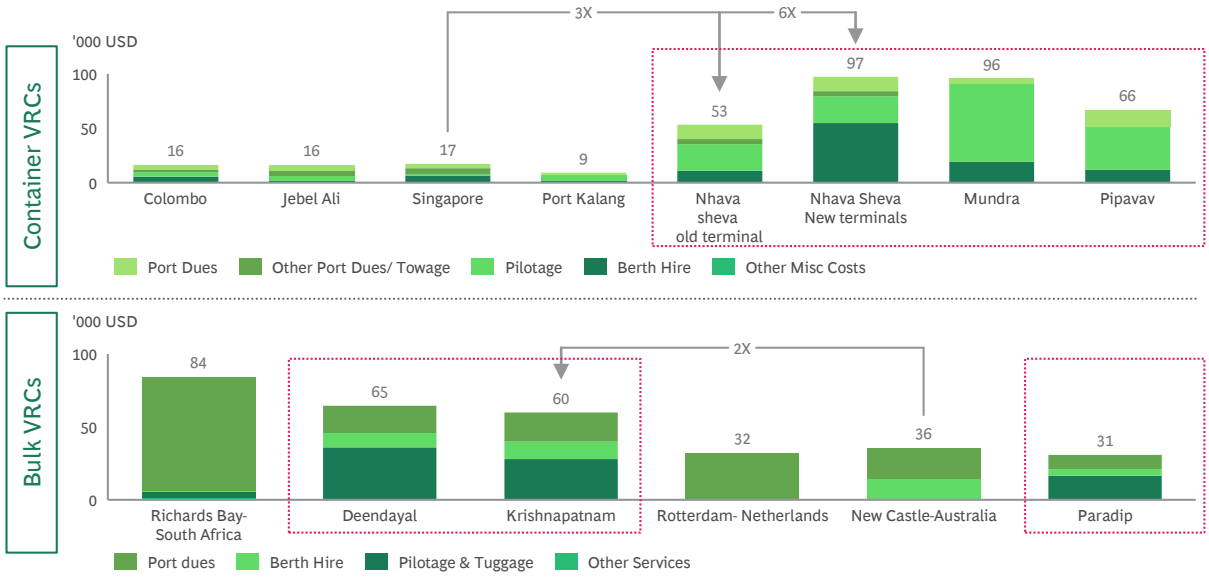
Exhibit 2.24 | E2E EXIM logistics costs for bulk cargo



Note:
1. Assuming one truck carrying 40 tons of coal
2. 600 Tons can be kept in a 100 sq.m area for coal; license fee cost is 1200 INR/100 sqm/month
3. Typical truck charges for 100 Kms carrying 40 tons of coal – INR 1000/ ton
4. Delivery by truck in case of unavailability of rail
5. Shore handling applicable in ports with no conveyor belts
6. Coal rail freight charges are 1000-2000 INR/ ton

Source: Secondary research, interviews with industry experts, TAMP

Exhibit 2.25| Container and Bulk VRC comparison



Note:
1. Nhava Sheva Old terminal are – JNPCT/GTI/NSICT, New terminals are – BMCT, NSIGT; 2. GRT - 91410 3. NRT – 43851 2. Light dues not included in the above diagram.
2. VRC calculated does not incorporate discounts, penal charges, incentives, charges for any special services; VRC for a 40,000 GT vessel with a berthing time of 48 hours

Source: Thrust area discussions

High operational expenditure is primarily driven by salaries / wages and operation & maintenance expenses. These form more than 2/3rd of the overall operating expenditure at Major ports currently (Exhibit 2.26)

Initiative 2.12: Reduce Vessel Related Charges (VRCs) in line with market trends and capital requirements

Under Major Port Authorities Act 2021, TAMP has been removed and the powers of tariff fixation will be given to Port Authorities based on the prevailing market conditions. Each Major port to reduce VRCs after assessment of market trends, capital requirements (e.g., for dredging, etc.) and revenue impact.

Also, Major ports needs to evaluate other sources of revenue which will compensate for loss in revenue through reduced VRC.

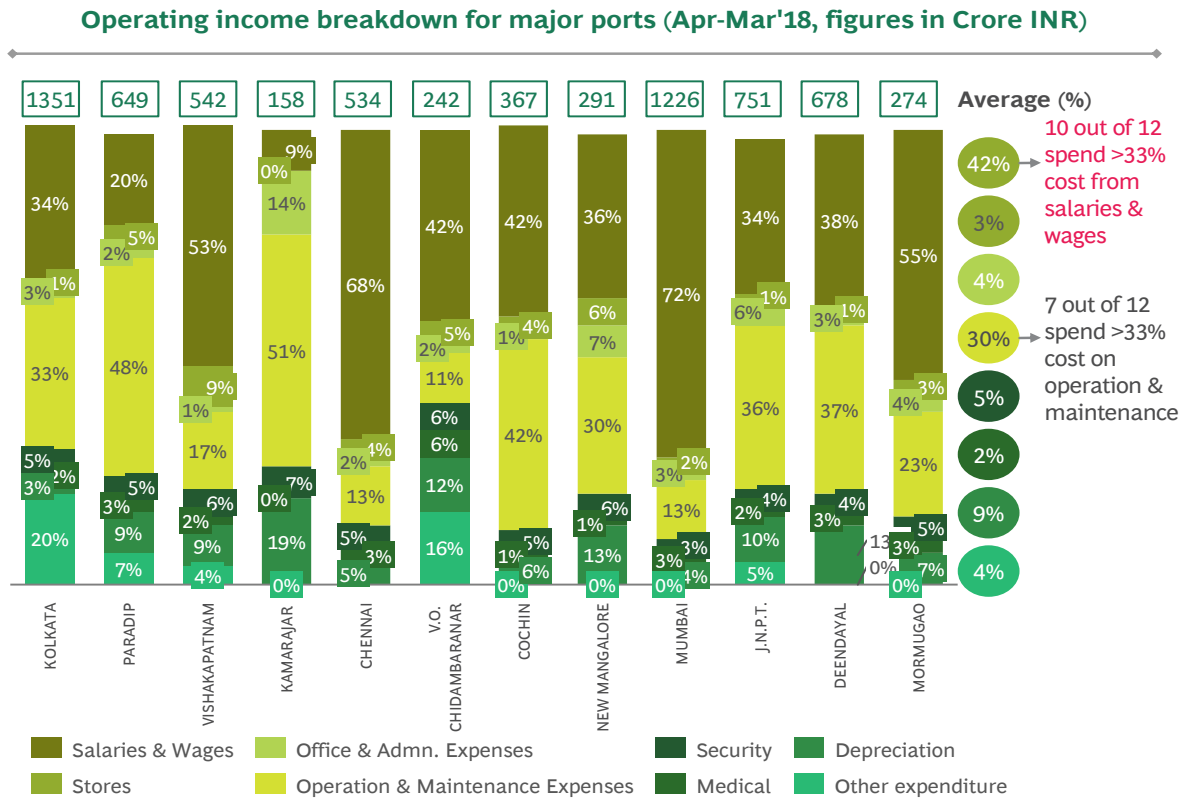
2.4.2 Revenue Augmentation and Diversification

Currently, Major Ports rely heavily on port & dock charges for revenue generation. Seven out of 12 Major ports derive more than one-third of their revenue from port & dock charges (Exhibit 2.27). Major Ports need to diversify to non-conventional sources of revenue and reduce reliance on port & dock charges.

Thrust area discussions identified four potential alternate sources of revenue for Major ports:

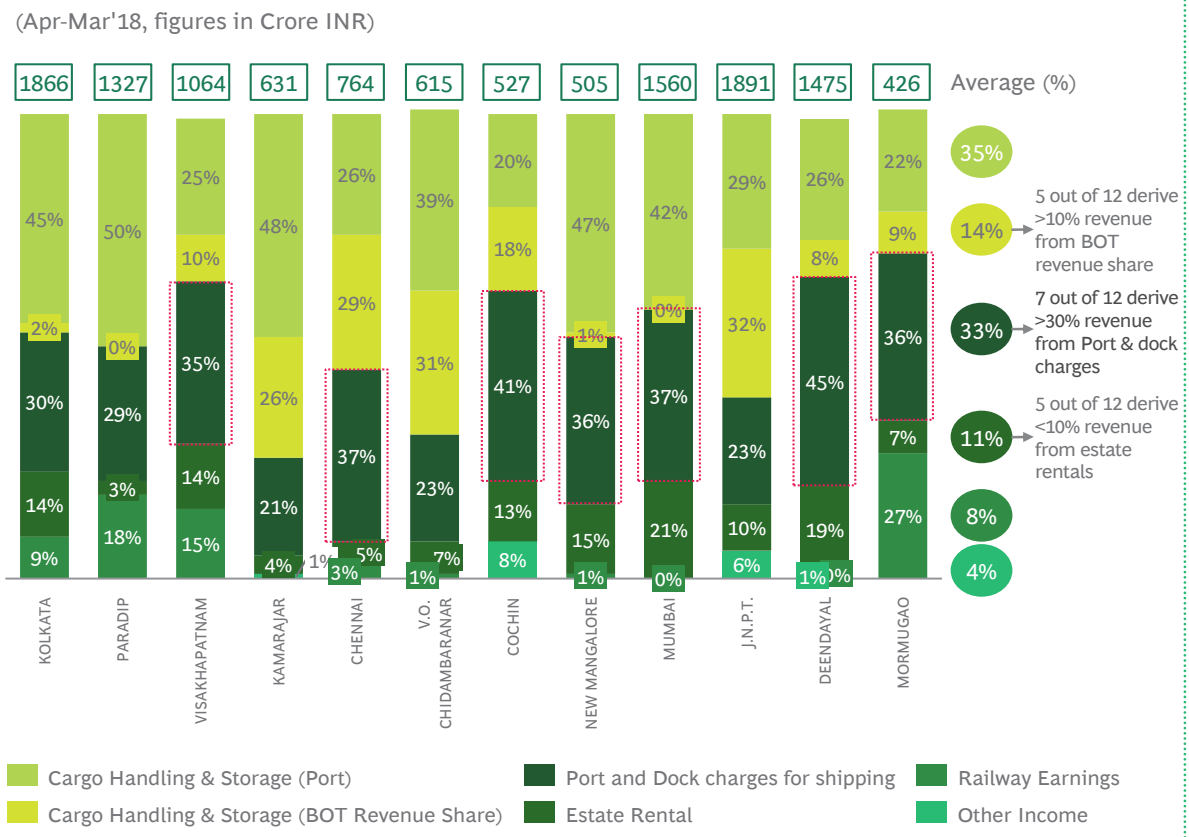
- Port-led industrialization (Covered in Section 2.5)
- Non-core assets monetization (non-required land identification and disposal across ports)
- Skill or expertise utilization e.g. technical consultancy, training institutes, etc.
- Monetization of Data – Sale of port data to consultancy firms nationally and globally

Exhibit 2.26 | Operating expenditure breakdown for major ports



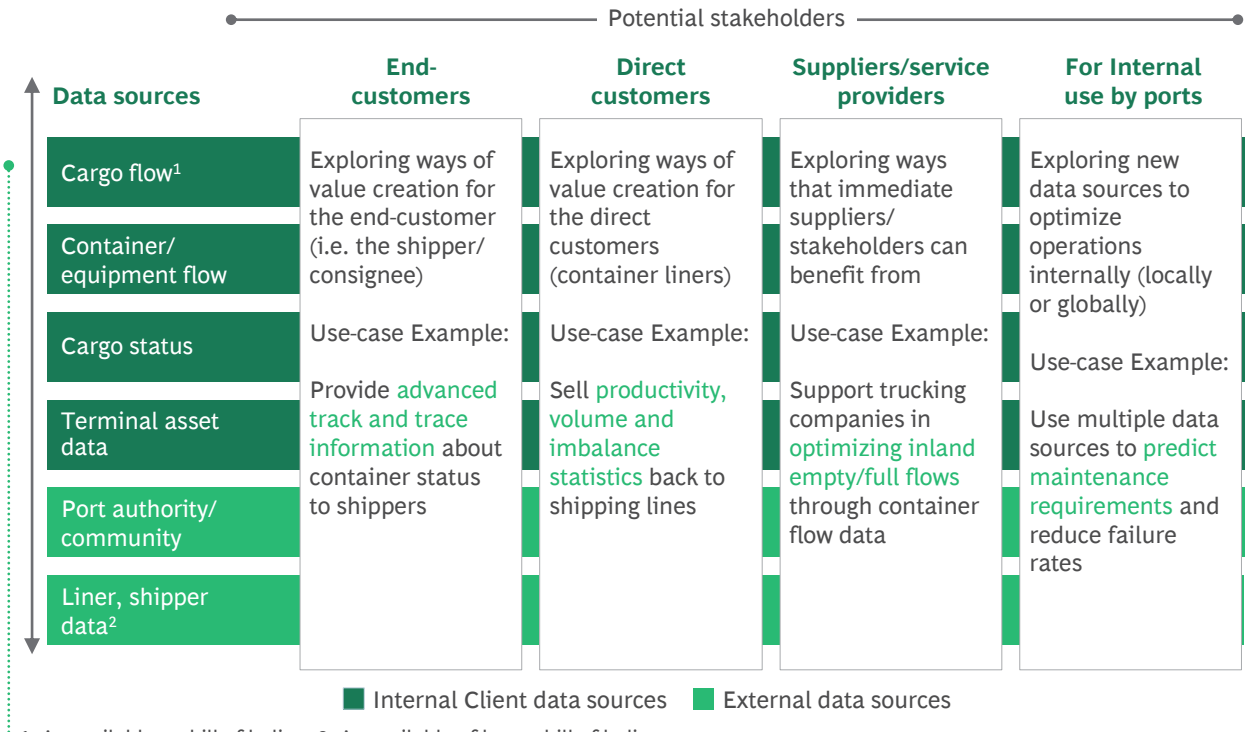
Note: Operations and maintenance includes key heads – contract payments for operations, repair & maintenance, electricity & water charges, Swach Bharat Abhiyan
Source – Financial information with detailed breakdown (IPA)

Exhibit 2.27 | Operating income breakdown for major ports



Source – Indian Ports Association

Exhibit 2.28 | Data monetization as a revenue stream



1. As available on bill of lading; 2. As available of house bill of lading

Initiative 2.13: Pilot and develop prioritized non-conventional sources of revenue for ports

Major Ports to evaluate and leverage maritime expertise for below avenues of revenue generation:

1. Technical Consulting Services:

- Leveraging internal expertise for technical advisory / consultancy projects to other ports
- Strategic and operational advisory to solve specific port issues

2. Global Training Institute:

- Imparting core and cross-functional domain knowledge through global partnerships
- Offering specialized modules on key topics such as safety practices, sustainability and Green port enablement

3. Data-as-a-Service:

Leading global ports have leveraged existing data as a revenue stream to various stakeholders. (Information Box 2.4) Significant potential exists to consolidate various available data sources and provide a differentiated offering to maritime stakeholders (Exhibit 2.28)

2.4.3 Direct Port Delivery (DPD) and Direct Port Entry (DPE)

Leading international and domestic ports have realized approx. 6-8 days and 1-2 days transit time savings through DPD and DPE respectively. Among Major Ports, DPD and DPE model are active at JNPT only currently. Key challenges related to lack of adequate infrastructure & services include:

- Storage space
- Trailers for movement
- Inventory management

Initiative 2.14: Increase use of Direct Port Delivery and Direct Port Entry at Indian ports to reduce the transit time and overall costs

Indian ports to push for increasing adoption of DPD and DPE mechanisms to reduce overall transit times and costs. Following steps to be undertaken:

- Assessment existing infrastructure readiness at all ports for DPD and DPE
- Basis gap assessment, each port to build required infrastructure
- Phase-wise roll-out of DPD and DPE across all major ports with clear target setting

Information box 2.4

Port of Antwerp | Monetization of Data as a revenue stream

- Signed an agreement with NxtPort committing to make all its data available on the platform
- Improved visibility of data, allowing stakeholders to make the entire shipping process more efficient, safe, and profitable
- Improved planning for available capacity and employees; queue and idle time minimization
- Illustrative applications:
  - Terminals gaining insight into how import cargo will be collected during unloading of a seagoing vessel
  - Software developers using the information for development of new applications

Source: Expert discussions, Port of Antwerp website

2.4.4 Reduce other logistics related costs in value chain

India presently faces shortage in availability of containers used for seaborne trade and goods movement. As a result of this shortage, the price for containers drive up increasing the cost of trade.

The container manufacturing market is currently concentrated in China, which captures 80% of market share. However, domestic production of standardized containers (20 ft and 40 ft) under the Atmanirbhar Bharat would help in ensuring a consistent supply and reduction in cost of trade.

Initiative 2.15: Reduce other logistics costs (eg. container related costs)

- Conduct comprehensive study to identify issues related to container availability and returns
- Assist in drafting a policy to promote container manufacturing in India

2.5 Port led Industrialization

Port led industrialization is very critical for developing economies. Advanced maritime nations have used port led industrialization aggressively in the last few decades to drive development. An integrated and comprehensive plan for port led industrialization in India needs to be developed combining the growth potential of port-linked industries with the competitive location for each industry.

Coastal Economic Zones (CEZs) and industrial clusters should be defined for each Major Port to act as the main vehicle for accelerating port led industrialization.

Initiative 2.16: Co-development models to drive port led industrialization through collaboration with various partners (e.g. NICDC, State Govt., etc.)

Global Ports have pursued land development through one of the two models as below (Information box 2.5):

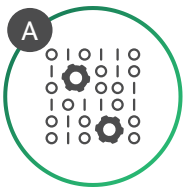
Indian Ports have predominately adopted self-development model till now and need to explore tie-ups with Central bodies, State Govt. programs and private players for co-development model going forward. For example, National Industrial Corridor Program (NICDC) will drive industrial development program with states as follows:

- Special Purpose Vehicles (SPVs) are created (project/ city level) between National Industrial Corridor Development and Implantation Trust (NICDIT) & State Govt.
  - NICDIT offering equity / debt
  - State Govt. offering land for development
- NICDC serving as knowledge partner
- SPVs are responsible for project implementation and O&M

Information box 2.5

JAFZA – Self- development model

- Deploys upfront capital & develops plug and play infrastructure – utilities, road, connectivity
- Large specialized in-house teams (ranging from 50-150 employees) for end-to-end management:



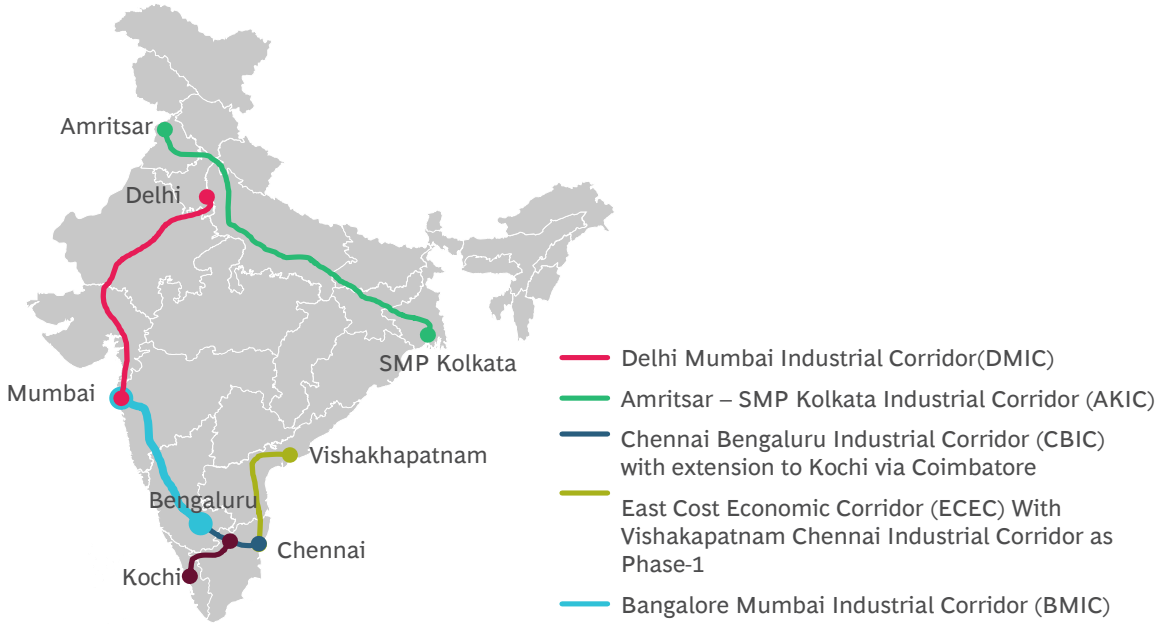
Port of Rotterdam – Partnership model

- Land development augmented through partnerships
  - Collaboration with DHG, a specialized developer
  - 240 Ha property developed since 2006 in Port of Rotterdam
- Has in-house capabilities / dept. to support the model such as:
  - Commercial outreach & bidding
  - Real estate management
  - Port & industrial development

Source: Press Search

Given that, 5 Major ports will be impacted by the industrial freight corridor - Mumbai, Cochin, Chennai, Vishakapatnam, and SMP Kolkata (Exhibit 2.29).

Exhibit 2.29 | Routes in National Industrial Corridor Program



National Industrial Corridor Development and Implantation Trust (NICDIT) – A trust fund to carry out project development and implementation
Source: National Industrial Corridor Development Corp - NICDC

Following four models can be explored by Major ports for collaboration with various partners to drive port land industrialization:

	Private developer	State govt.		Central Govt. body
	Co-development	**Land allotment**	**Joint development**	**Central body collaboration**
Collaboration Mechanism	SPV with a private co-developer	Allot land parcel(s) to State Govt. for establishing industrial parks	SPV between State govt. and Port Authority	SPV between Port Authority (offers land) and NICDC (offers equity/ debt)
Benefits/ incentives offered	Port Authority offers incentives such as: • Land cost subsidy to anchor tenants • Subsidy on green buildings, etc.	State govt offers incentives and benefits (tax benefit, loan, subsidy) similar to other state industrial parks	State govt and Port Authority offers incentives and benefits through SPV	NICDC and Port Authority offers incentives and benefits through SPV
Revenue model	• Revenue share • Flat rental	• Revenue share • Flat rental	• Revenue share	• Revenue share

Source: Press Search

These Major Ports can form SPVs with NICDIT by offering land for port-led industrialization. Other ports can also collaborate with NICDIT under similar mechanism.

Major ports can also work with state industrial corporations to setup SPV and conduct joint development of port land. This would help ensure investors get benefit of state industrial policies along with ease of doing business.

Initiative 2.17: Drive commodity-specific industrialization efforts by identifying targeted industries relevant to port location

Commodity-specific industrialization at each Major Port will not only help in optimal movement of cargo from the industrial locations but also harness the growth potential of port-linked industries effectively. Major Ports to prioritize target commodities / industries and aim to develop ecosystem based on:

- Ability to generate EXIM cargo – commodities with high volume or high cargo value
- Availability of ecosystem near ports – raw materials, suppliers, etc.
- Emerging industries looking to de-risk supply chain – import substitution, export focused sectors
- Industries with Govt. support to Make in India

12 industries have been identified for Major Ports to focus in near-term (Exhibit 2.30):

Initiative 2.18: Develop plug and play infrastructure / value-added services and commercial flexible terms for attracting industries to port land

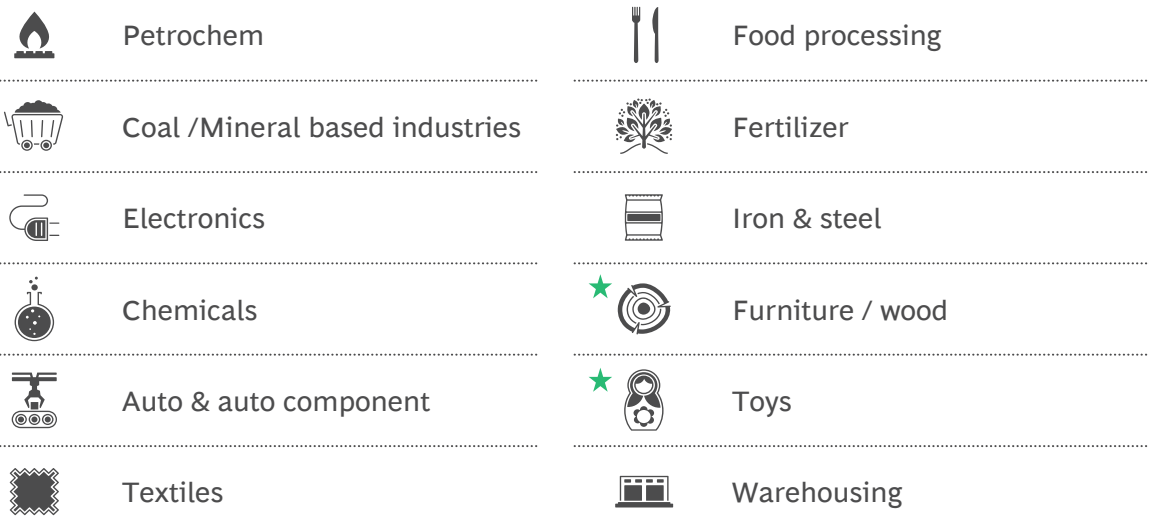
Several international ports have focused on developing plug & play infrastructure and value-added services to drive port land industrialization (Information box 2.6-2.8). A compelling value proposition for investors for successful land industrialization includes 4 key components as below:

- Ready Plug and Play infrastructure for quick set-up – Levelled land, roads, power line, water, etc. in the industrial area
- Services to reduce cost of operations & drive differentiation – Efficient logistics / evacuation, lower power cost and other services
- Sector focused park with an aim to create ecosystem plays – Sector focused park, aggregation of suppliers, etc.
- Flexible & competitive commercial model – Flexible commercial land policies and terms for lease

Indian Ports need to undertake following steps:

- Identify relevant infrastructure needed for industries in port land
- Evaluate port industry services to be offered
- Deploy upfront capital (internal reserves or co-development) to develop plug and play infrastructure
- Devise and offer competitive commercial terms to industries (e.g. flexible rental payments, etc.)

Exhibit 2.30 | 12 industries to focus on



Source: Press Search

Information box 2.6

Port of Rotterdam

Background

Maasvlakte 2, an area of 80 hectares at Port of Rotterdam is being developed for companies that focus on the supply, storage and processing of biomass

Plug n play infra offerings

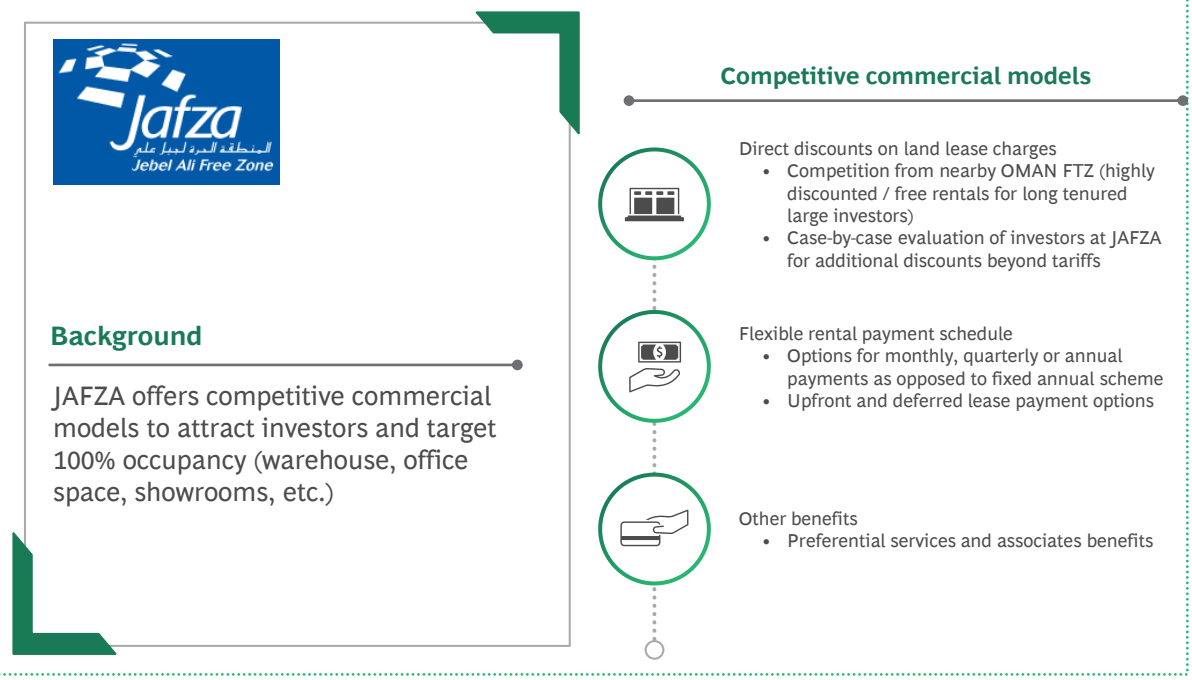
Port of Rotterdam offers plug and play infra with all requisite industrial utilities for bio-based industry clients:

- Tank storage for dry and wet bulk
- Process water, cooling water and waste water filtering
- Road connectivity to each plot

Information box 2.7

- Port has set up a park that offers holistic services such as efficient evacuation (helipad)
- Present in a large parcel spread across >150 acres
- Supports North Sea exploration for Statoil, Exxon & Total

Information box 2.8



Initiative 2.19: Establish centralized investor outreach and marketing cell under IPA/MoPSW to attract investment in port land

Thrust area discussions highlighted the need of a central body for coordinated investor outreach and marketing engagement across Major Ports. Hence, Ministry of Ports, Shipping and Waterways should establish a central cell to drive outreach & marketing across all Major ports. Key responsibilities of the central cell to include:

- Information collection from ports e.g. land availability, facilities, upcoming events, etc.
- Drive land promotion centrally and manage coordinated reach-out to investors
- Act as single of point of contact for investment facilitation

In addition to central cell, IPA should set up a one stop shop digital land portal as well to provide real-time information of land at ports to investors.

2.6 Conclusion summary

18 initiatives have been identified across four key intervention areas to improve the logistics efficiency and cost competitiveness at Indian ports and maritime bodies. Key focus areas are as below::

1. Cargo Modal Shift and Coastal Shipping

- Develop commodity specific handling infrastructure at ports to promote modal shift to coastal shipping
- Establishing Coastal & Inland Cargo facilitation Centre for outreach & collaborative planning with PSUs, private players, rail/road ministries

2. Operational efficiency & evacuation

- Improving port performance to world class levels across container and dry bulk terminals
- Promoting evacuation through better E2E connectivity to ports through rail, road, coastal & inland waterway routes and ancillary services

3. Reducing Cost of Doing Business (CoDB)

- Reducing Vessel Related Charges (VRCs) in line with market trends and capital requirements
- Promoting DPD and DPE across Major Ports

4. Port led Industrialization

- Driving industrialization through collaboration with various partners, upfront infrastructure and a dedicated investor cell

As part of Vision 2030, globally benchmarked targets have been defined to improve logistics efficiency and cost competitiveness. In addition to reaching benchmark levels in these initiatives, the achievement of targets is expected to help the country save approx. INR 17000-20000 Cr in inventory holding costs and INR 9000-10000 Cr. in logistics costs per annum. Furthermore, port-led industrialization has approx. INR 10000+ Cr. value unlock potential for Major Ports (Exhibit 2.31).

Exhibit 2.31 | KPI targets and impact

	Key performance indicators	Current	Target (2030)
1	Indian ports in World top 10 in terms of productivity	-	2
2	% of port land[2] industrialized	-	100%
3	VRC[1] multiple at Major ports compared to international ports	2X+	1X
4	Truck turnaround time	6 hours	<3 hours
5	Average vessel turnaround time (containers)	25 hours[3]	<20 hours
6	Average container dwell time	55 hours	<40 hours
7	Average ship daily output (gross tonnage)	16,500	>30,000

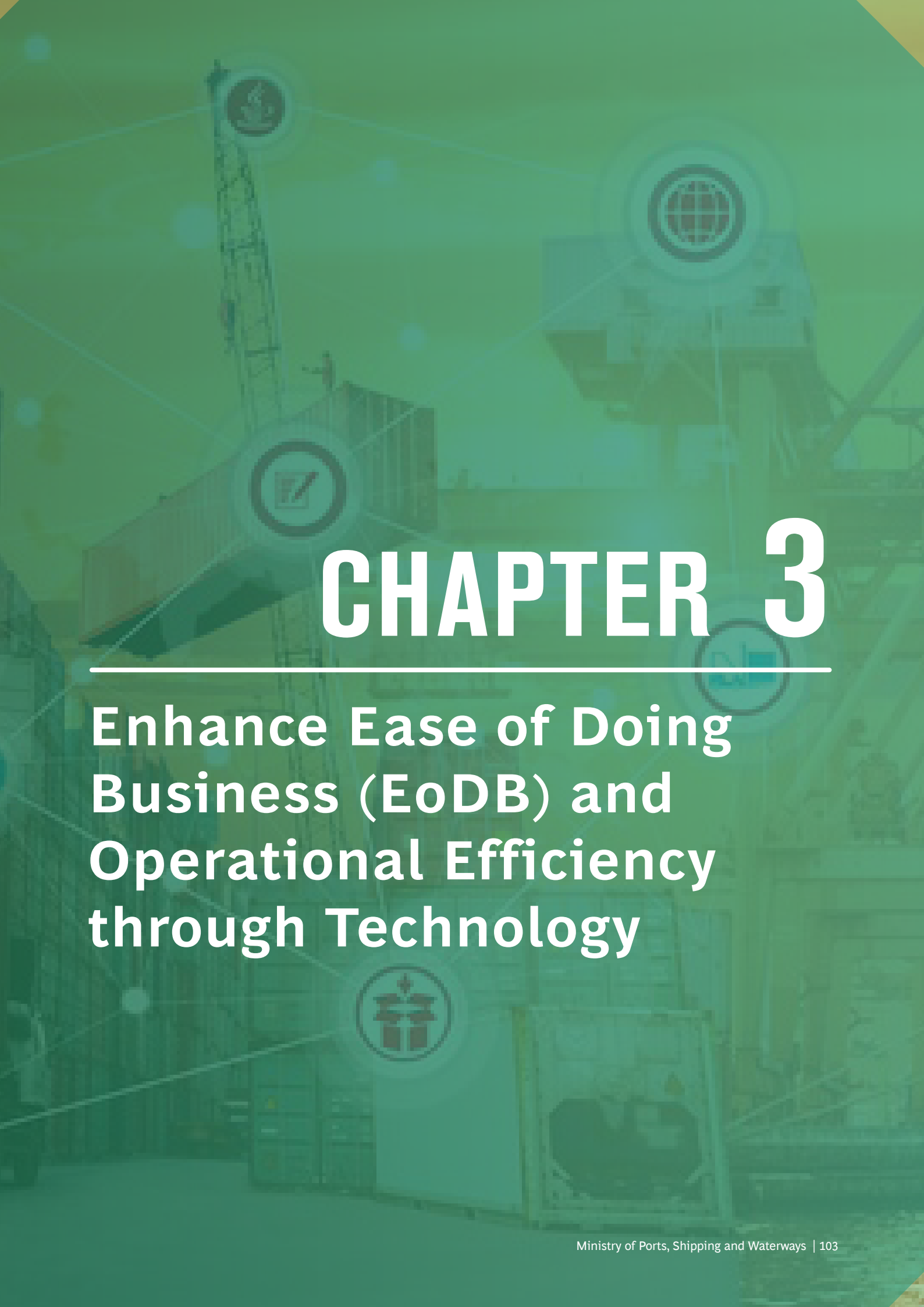
INR 45,000 Cr.+ (Investment in port led industrialization)

INR 17,000 – 20,000 Cr. (Reduction in inventory holding costs)

INR 9,000 – 10,000 Cr. (Savings potential in Coastal)

INR 10,000 Cr.+ (Revenue from ports from industrialization)

1. Vessel Related Charges for both container and bulk; 2. % of land industrialized out of total land available; 3. IPA's port statistics report FY19-20; TRT considered for Major Container Ports (JNPT, Chennai, Cochin, Vishakapatnam, and V.O.Chidambaranar)



CHAPTER 3

Enhance Ease of Doing Business (EoDB) and Operational Efficiency through Technology

Enhance Ease of Doing Business (EoDB) and Operational Efficiency through Technology

3.1 Introduction

Several initiatives have been undertaken in recent times to improve Ease of Doing Business in Indian Maritime sector. For instance, The Port Community System (PCS) 1X has been operationalized in 19 port communities across 27 stakeholder types, thus enabling vessel related message exchange between ports and customs. Enterprise Business System (EBS) is under implementation at 6 Major Ports (Mumbai, Chennai, Deendayal, Paradip, V.O. Chidambaranar, and SMP Kolkata) and will be extended to other ports in the future. Moreover, Indian ports have adopted some digital initiatives such as on-road examination of containers, automated gate processing enablement, online berthing systems, etc.

India's exports need to grow on an accelerated basis in the next 5 to 10 years to enable the country to achieve the desired share in world exports[1]. Shipping ecosystem will play an important role in achieving this objective. There are many stakeholders and non-standard processes in the sector today. This leads to variability in time/costs across functions and ports. There is a strong need for integrated efforts to simultaneously enhance EoDB and LPI rankings and further strengthen India's competitiveness at the global and regional levels.

It is imperative for India to strengthen its maritime capabilities and improve its ease of doing business in maritime sector through a set of comprehensive changes in logistics value chain.

2020 World Bank Global LPI rankings

	Rank	
	7	Singapore
	26	China
	41	Malaysia
	44	India

India currently stands at 63rd among 190 countries, according to the 2020 World Bank EoDB Report[2].

While India's Trading across Borders ranking in EoDB has improved from 146 in 2018 to 68 in 2020[2], what it needs now is E2E maritime logistics chain digitization and integration of all trade stakeholders. Hence, following four focus areas have been identified to enhance EoDB and improve operational efficiency:

1. Digitization to facilitate EXIM trade
2. Digital-led Port Operations Enhancement
3. Ports Functional Processes Efficiency Improvement
4. Digitization in Other Maritime Areas

1. Confederation of Indian Industry (CII) report - Reorienting India's Export Endeavor in the Covid-19 World
2. 2020 World Bank EoDB Report (https://www.doingbusiness.org/en/rankings)

3.2 Digitization to facilitate EXIM trade

Today maritime logistics ecosystem faces several challenges (Exhibit 3.1):

- Several EXIM processes are not digitized, impacting efficiency of logistics
- Higher paper rework and duplication as compared to best-in-class benchmarks
- Intermittent tracking and traceability of cargo
- Absence of standardized formats across stakeholders
- Inadequate data exchange across authorities to provide a holistic view
- Lack of standardized operating procedures and timeframes for giving approvals
- Limited integration with international stakeholders

Central Govt. is leading charge to create a unified logistics system – National Logistics Portal (NLP) – integrating all supply chain elements in India across various modes of transport like roads, railways, etc. As a part of same, a National Logistics Portal (NLP) Marine has been envisaged to solve many current EXIM challenges. This step is aligned with the global trend of building end-to-end supply chain solutions in shipping. For example, world-class ports such as the Port of Rotterdam and the Port of Singapore are actively enabling digitization within supply chains through multiple platforms (Information box 3.1 and 3.2).

Initiative 3.1: Implement National Logistics Portal (NLP)-Marine to enable single integrated platform for EXIM stakeholders

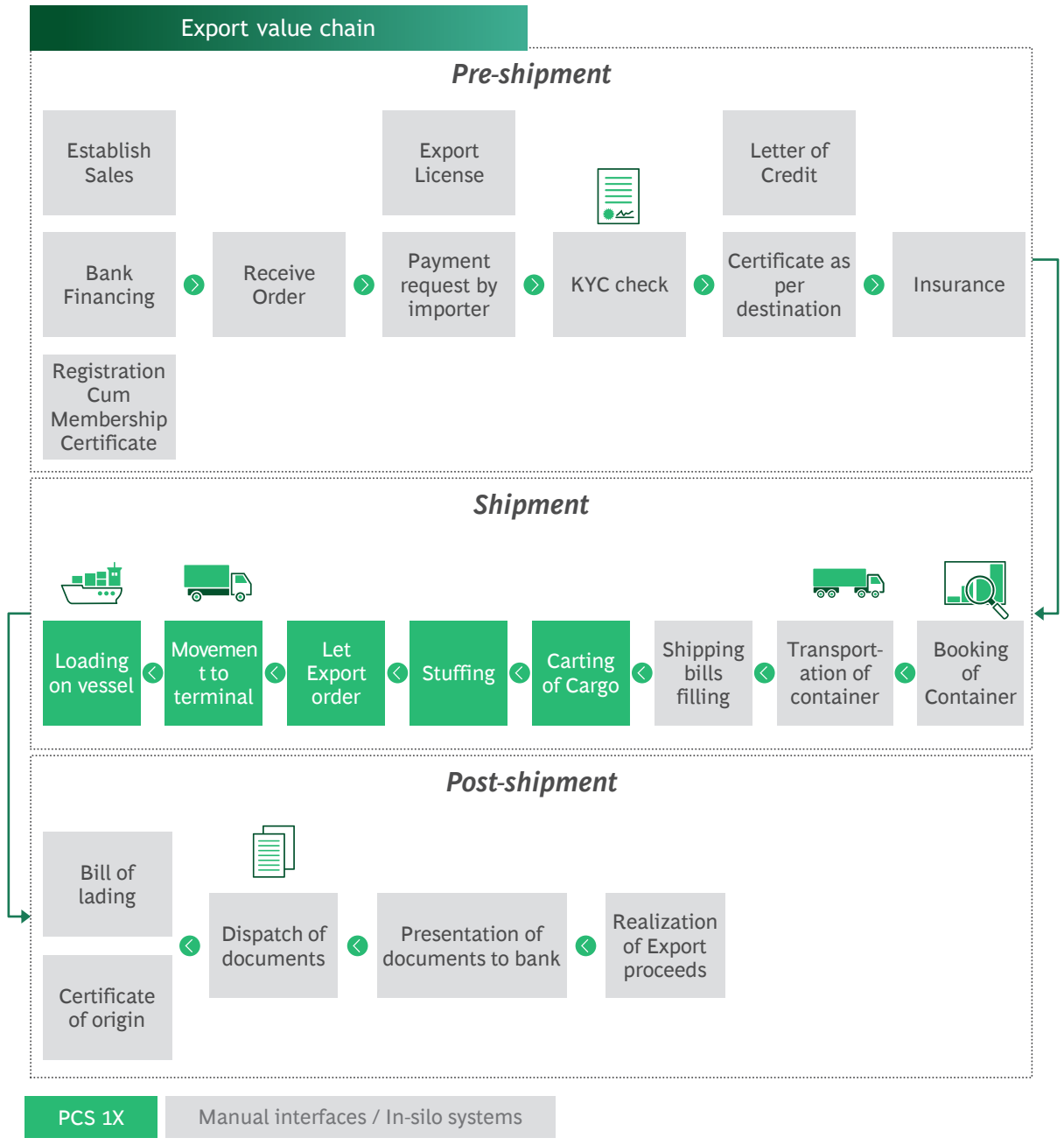
NLP Marine system is envisaged to address most of the challenges faced in the current system by providing a single window platform across maritime stakeholders including ports, shipping lines, regulatory bodies and service providers (Exhibit 3.2). The system will provide multiple channels or interfaces to stakeholders and is expected to deliver value by reducing costs, decreasing dwell-times and increasing convenience for all stakeholders in the maritime supply chain. These benefits are expected to lead to substantial growth in transaction volumes.

NLP Marine will be developed in conjunction with the existing PCS1x platform and will provide API integration facility with various Port Operating Systems, Terminal Operating Systems, and other stakeholder(s) systems. This entire ecosystem will be built on open standards with plug-and-play capabilities to allow changes at sub-system levels without affecting other parts and enable a heterogeneous multi- stakeholder environment to colloborate seamlessly.

It is envisaged that many standalone applications, developed by multiple vendors, users and other stakeholders will have the ability to be integrated with NLP Marine (Exhibit 3.2). The system will provide several “Latch-on” opportunities for services related to EXIM, coastal, and inland waterways to connect on the platform.

Moreover, it will have capabilities to connect with international stakeholders for seamless exchange of documents and transaction data in a transparent and quick manner.

Exhibit 3.1 | High degree of manual interfaces in current EXIM value chain

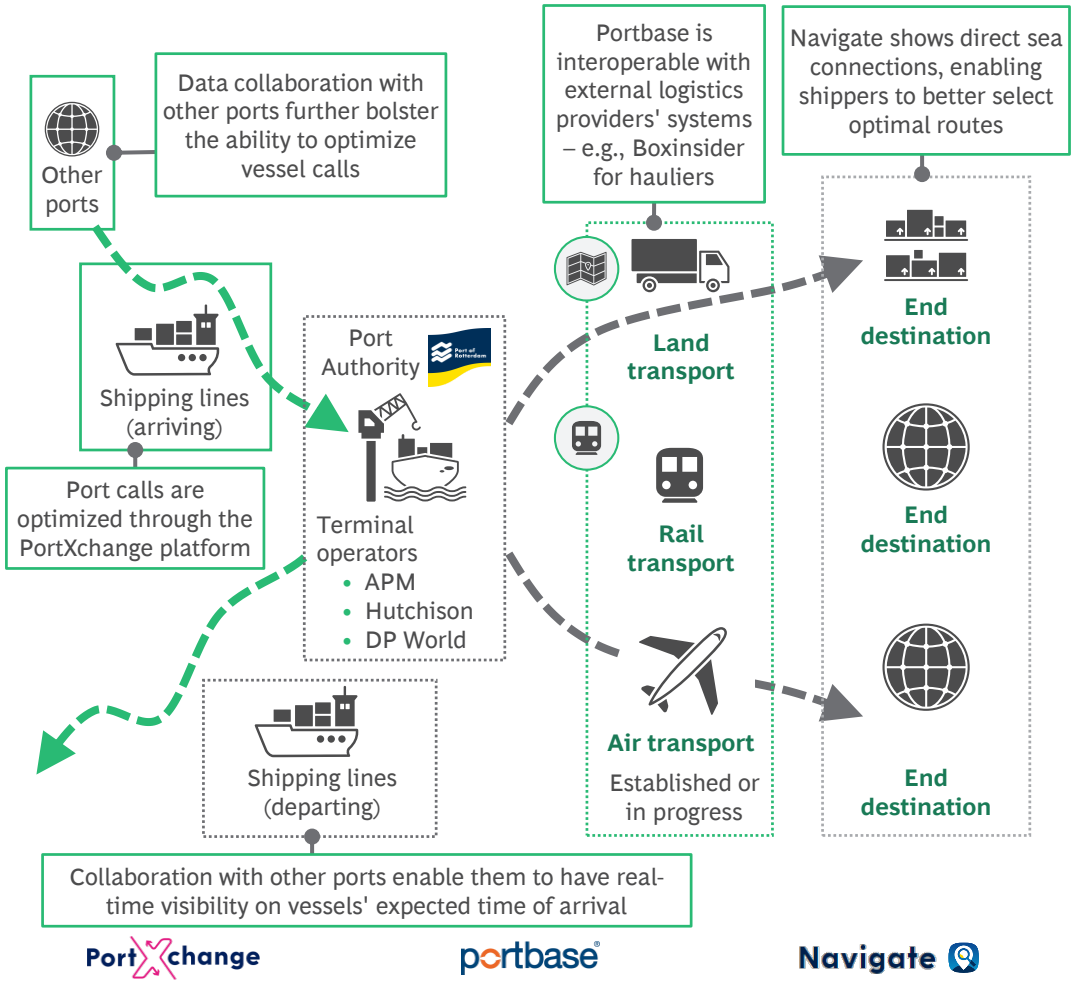


Source: Expert discussions

Information Box 3.1

Port of Rotterdam has collaborated with multiple industry bodies to develop a consortium of digital platforms providing an integrated solution across stakeholders. These include –

- **PortXchange:** Used by Shipping lines, other ports
- **Portbase:** Used by terminal operators and logistics providers
- **Boxinsider:** Used by truckers
- **OnTrack:** Used by rail
- **Navigate:** Used by shippers and forwarders



Source: Press releases, Expert discussions

PortXchange platform helps in collaboration with shipping companies, agents, terminals and other service providers for planning, execution and port call optimization. PortXchange is also linked to a range of maritime service providers (e.g. bunkering companies and harbour crafts) and utilizes AI to continuously enhance optimization algorithms.

Portbase is a modified terminal operating system that is inter-operable with external logistics providers' systems such as Boxinsider for hauliers, OnTrack for rail logistics, Streamline for container matching with inland operators, etc.

The Port of Rotterdam has also developed a Navigate system for shippers and forwarders to have a complete overview of the most efficient transport routes, allowing shippers to compare between different companies.

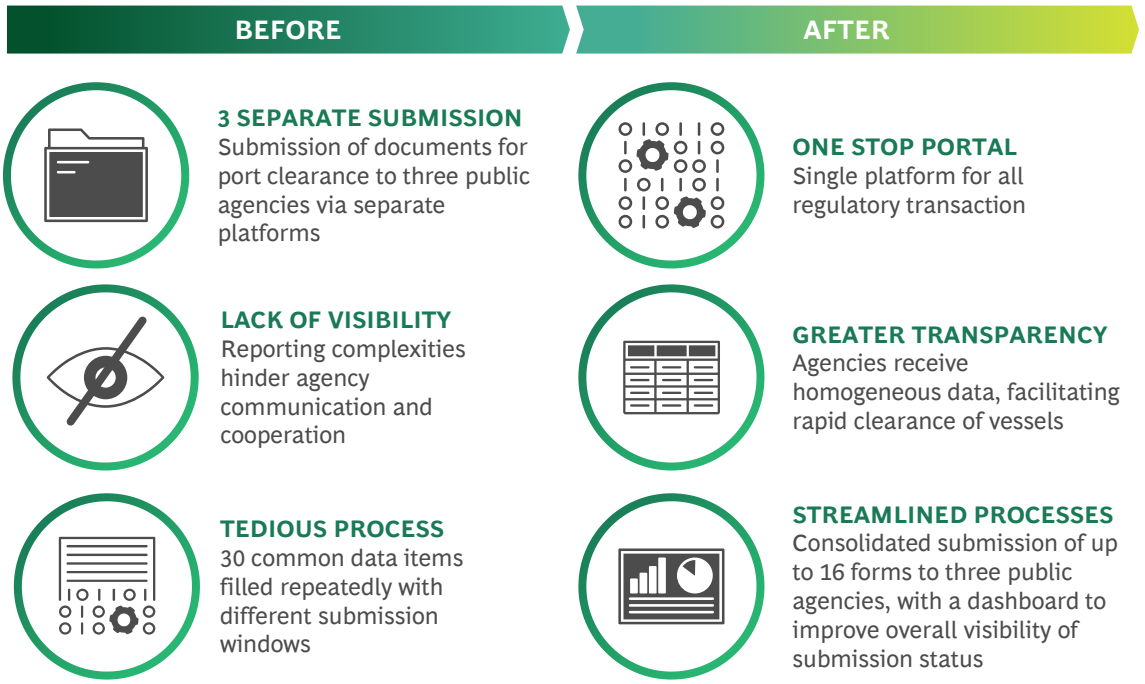
Moreover, the Port of Rotterdam has established data sharing agreements with other ports (e.g. Antwerp) to further bolster port call analytics and enabled an 'ecosystem of ports'.

*Basis Expert discussions and Press releases

Information Box 3.2

Maritime and Port Authority (MPA) of Singapore is ushering the next phase of maritime digitalization through digitalPORT@SG™ and digitalOCEANS™ and promoting greater connectivity among the global community.

Launched in 2019, Phase 1 of digitalPORT@SG™ streamlines regulatory transactions (i.e. B2G) onto a single portal. Phase 2 is aimed at facilitating the ordering of marine services and just-in-time operations in the Port of Singapore.



MPA Singapore further launched the digitalOCEAN^{STM} initiative to harness the full benefits of digitalization. It aims to champion the development and adoption of common data standards and common exchange APIs to facilitate port clearance across the world.

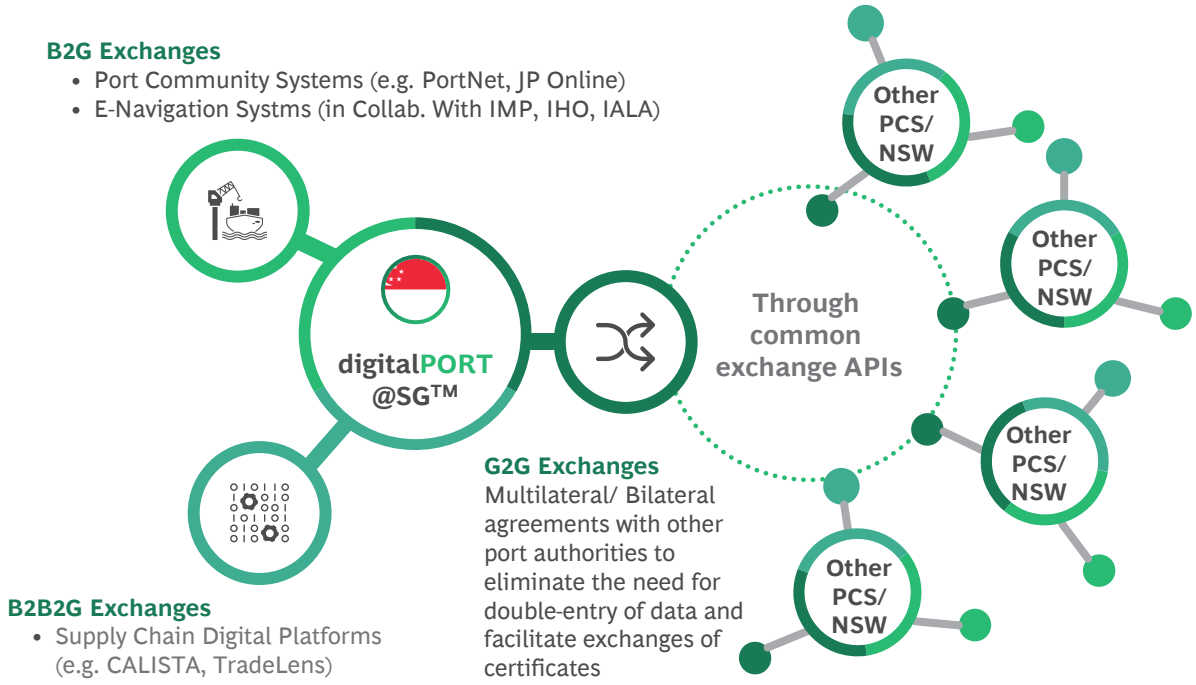
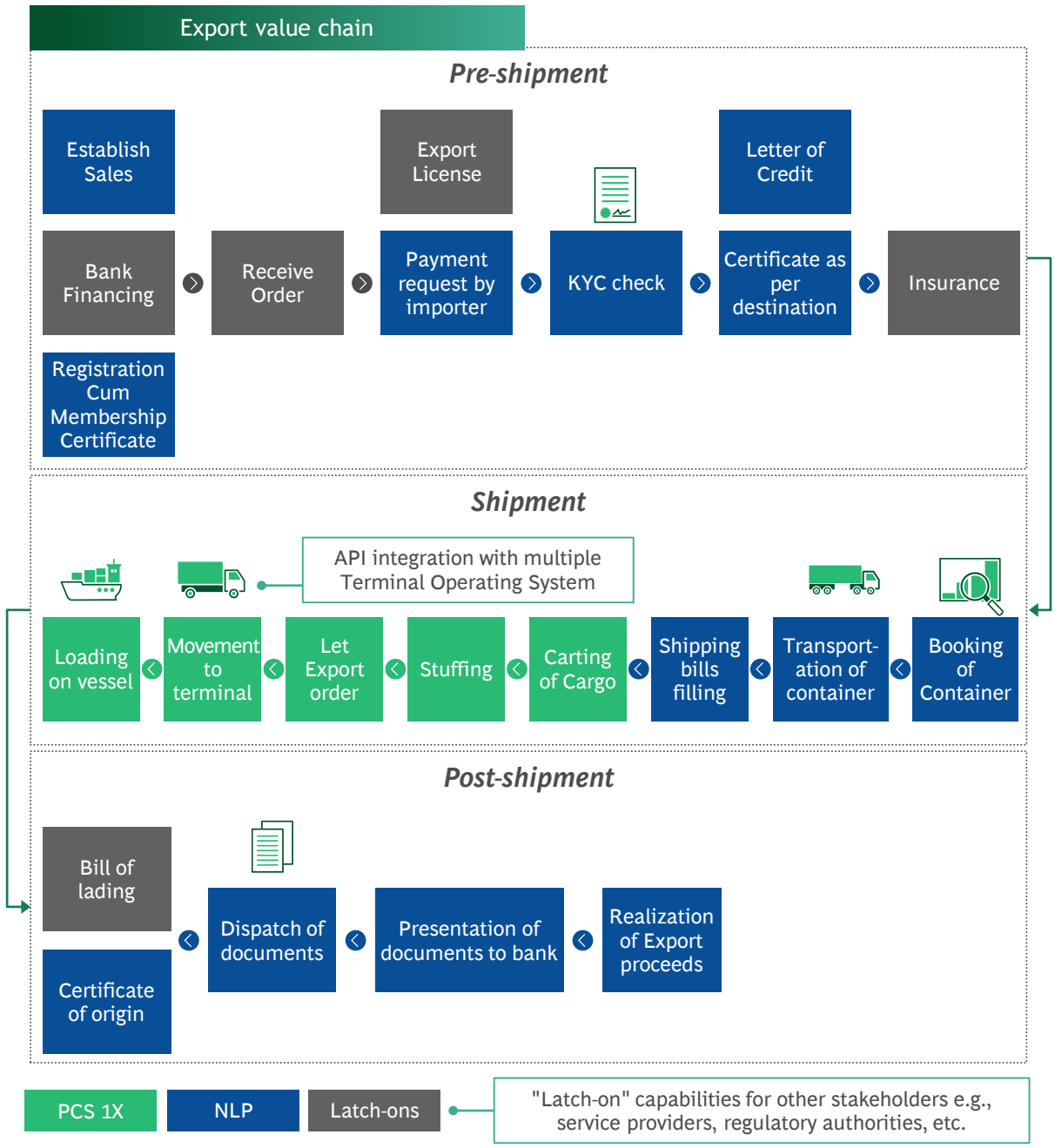


Exhibit 3.2 | NLP Marine to enable E2E paperless EXIM activities



Source: Expert discussions

NLP Marine is envisaged to offer four key services for the maritime stakeholder community:

Cargo Services

Cargo Services will include all activities performed at custodians' premises, such as port / terminal/ICD/CFS etc. In addition, it will also cover operations performed at warehouses and activities for handling non-containerized cargo.

Carrier Services

Carrier Services will cover activities related to shipping lines, shipping agents and airlines:

- Inland waterways will be integrated to provide their services on NLP
- Services such as container booking / slot booking etc.
- Services involved under rail/road movement of goods

Regulatory and PGA Services

An integrated regulatory module will enable data interchange with customs, PGAs and EPCs. It will allow exporters and importers to access facilities like Digi-lockers. It will also allow them to check status of various compliances (Exhibit 3.3) as mentioned below:

- NLP will display the specific certifications required for different goods and origin-destination pairs
- Common Application Form (CAF) will be provided to simplify regulatory processes
- Specific information from the CAF will be shared with the respective PGA/ EPC for certification processes
- Facility for applications for Import-Export Code (IEC) and other licenses will be provided
- Commodity-specific bodies such as FSSAI / Coffee Board / Textile Committee etc. will be able to provide certificate / clearance for shipments

Banking and Financial Services

Banking and financial services module will have banks, insurance companies and traders as the main users. The module will have the following facilities:

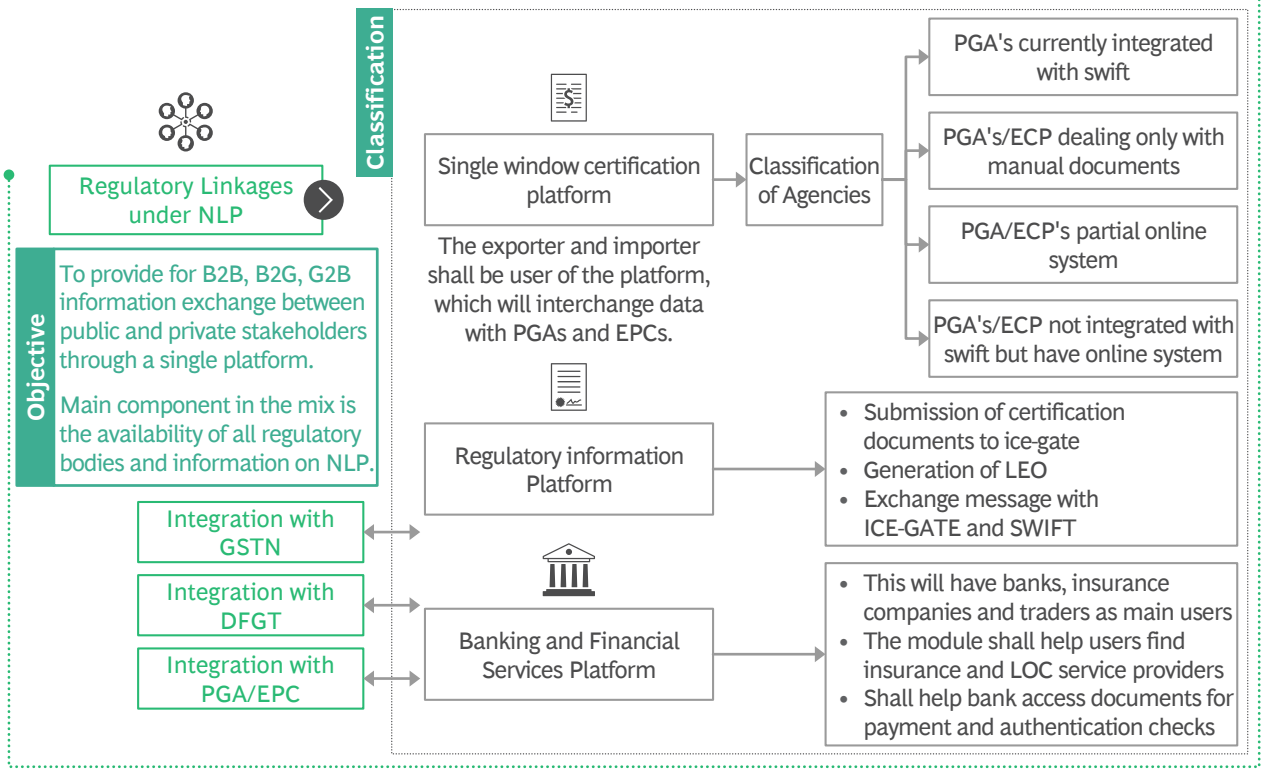
- Users can find insurance and LOC service providers
- Banks can access documents for payment and authentication checks
- Enable transaction services such as e-payments for all stakeholders
- Services such as LC processing, Bank Guarantee processing, etc. will be provided
- Reconciliation services to enable service providers and consumers to track payment history easily and enable faster reconciliation
- Onboarding of insurance providers for domestic / international cargo transportation

Key benefits of NLP Marine:

1. Single platform for core activities of the importer/exporter/freight forwarder etc.
2. Domestic tracking of shipment with notifications
3. End-to-end functionality to perform self-clearance digitally
4. Remote EDI System Package – For Bill of Entry and Shipping Bill checklist
5. Cloud-based document management
6. Real time information e.g. Vessel related information, Terminal Gate Transaction, CFS Transaction etc.
7. Payment digitization e.g. CFS Charges, Line Charges, etc.
8. Integrated Data Lake and analytical capabilities

In light of the above-mentioned necessity and advantages of migrating to the NLP ecosystem, IPA shall appoint a partner that will help in the development, commissioning and operationalization of the National Logistics Portal (NLP) Marine.

Exhibit 3.3 | Regulatory Linkages under NLP Marine



3.3 Digital-led Port Operations Enhancement

Most Indian Major Ports need to enhance adoption of digital solutions to improve operations efficiency and stay ahead of competition. Three areas of interventions are:

1. Digitization affects entire functional landscape. Leading global ports have taken an integrated front-to-back approach that goes beyond mere digital-channel functionality.
2. Digital architectural strategy should extend beyond solutions offered by mainstream software and help ports easily accommodate future developments in technology (Information Box 3.3).
3. Implementation pathways (such as build or buy) should be carefully chosen because they pose different investment and risk profiles

Initiative 3.2: Implement 50+ digital initiatives to transform Major ports into 'Smart Ports'

Smart Ports of the futue will be digitized, integrated with the wider end-to-end supply chain, and pioneer new business models that will change the logistics landscape (Exhibit 3.4)

Smart ports will be data-driven, use automated devices, Internet of Things (IoT), and leverage analytical technologies for safer and more efficient management of resources (Information Box 3.4).

Thrust area discussions have identified use cases for use in Major ports and prioritized 57 such digital solutions / use-cases that will drive transformation of Major ports to "Smart Ports" (Exhibit 3.5). All Major ports should implement solutions identified as "Must-have" to move towards becoming a Smart port. Post adoption of "must have" solutions, major ports should evaluate the cargo profile and scale of cargo achieved to deploy "Logistics efficiency" solutions in a phased manner. With new technologies maturing, ports can also look to deploy "World Class ports" solutions to as part of their digital journey.

Information Box 3.3

Best-in-class modular architecture consists of Six key layers

Owing to multiplicity of systems and technologies, many Indian ports need to undertake an integrated front-to-back overhaul of the digital landscape across six architecture layers.

1. **Digital front end:** Provides device-, location-, and context-aware customer interfaces and enables ports to deliver a tailored and rich multichannel digital customer experience.

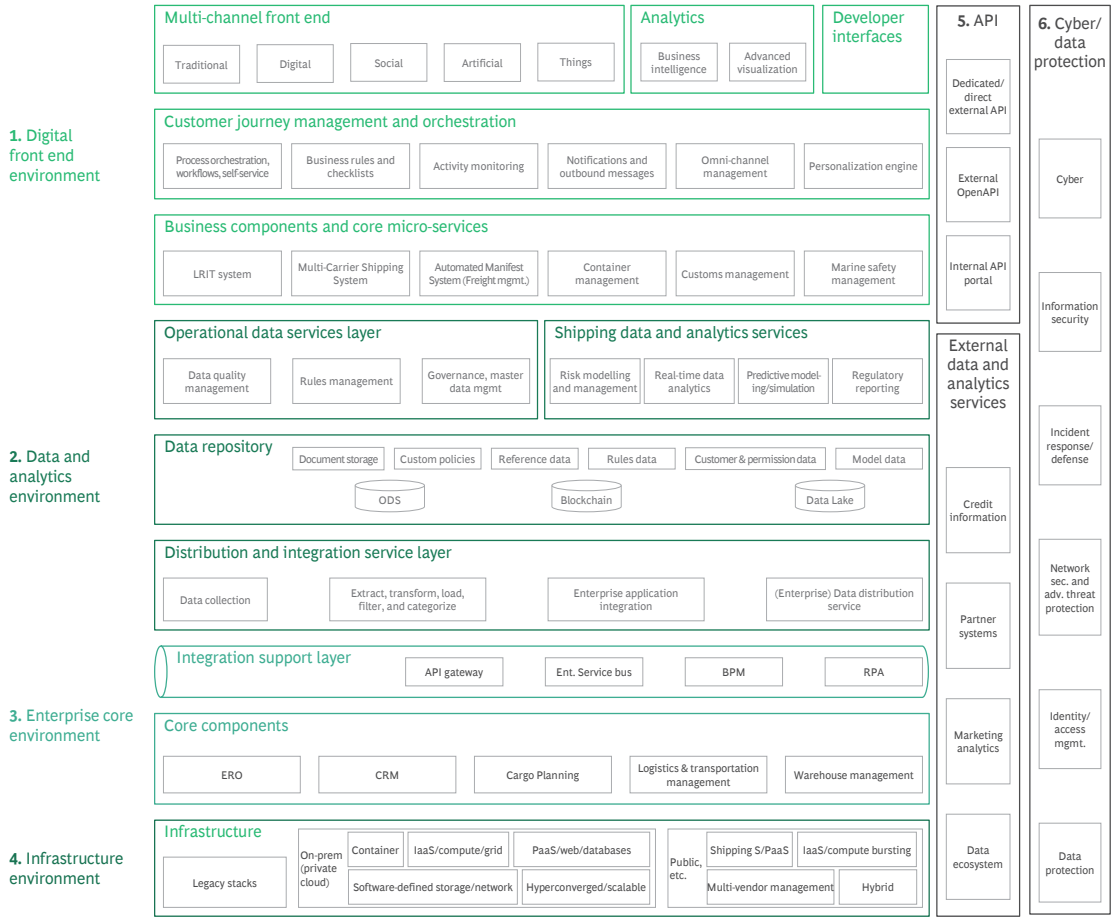
2. **Data analytics:** Aggregates all the data and makes it available for reporting, analytics and other services. This layer offers tailored customer-centric services and personalized risk profiles by using automated decision engines and artificial intelligence.

3. **Enterprise core systems:** Contains all systems of record for the core business (operations, vessel logs, daily output, etc.) and its support (risk management, finance, etc.).

4. **Infrastructure:** Captures all data (both structured and unstructured) for real-time processing and analytics. It envisages cloud solutions replacing on-premises legacy infrastructure.

5. **Integration:** Manages the integration of applications with external parties based on open Application Programming Interfaces (APIs).

6. **Cybersecurity:** Layer involves incorporation of proprietary interfaces with partners, aggregators, shippers, and clients, with perimeter security and data privacy confined to enterprise systems.



Source: Expert discussions

By 2030, Major Ports are envisaged to be multi-modal, connected hubs, playing a major role in India's growth

There exists a critical need for coordination and governance for this digital transformation of Major Ports.

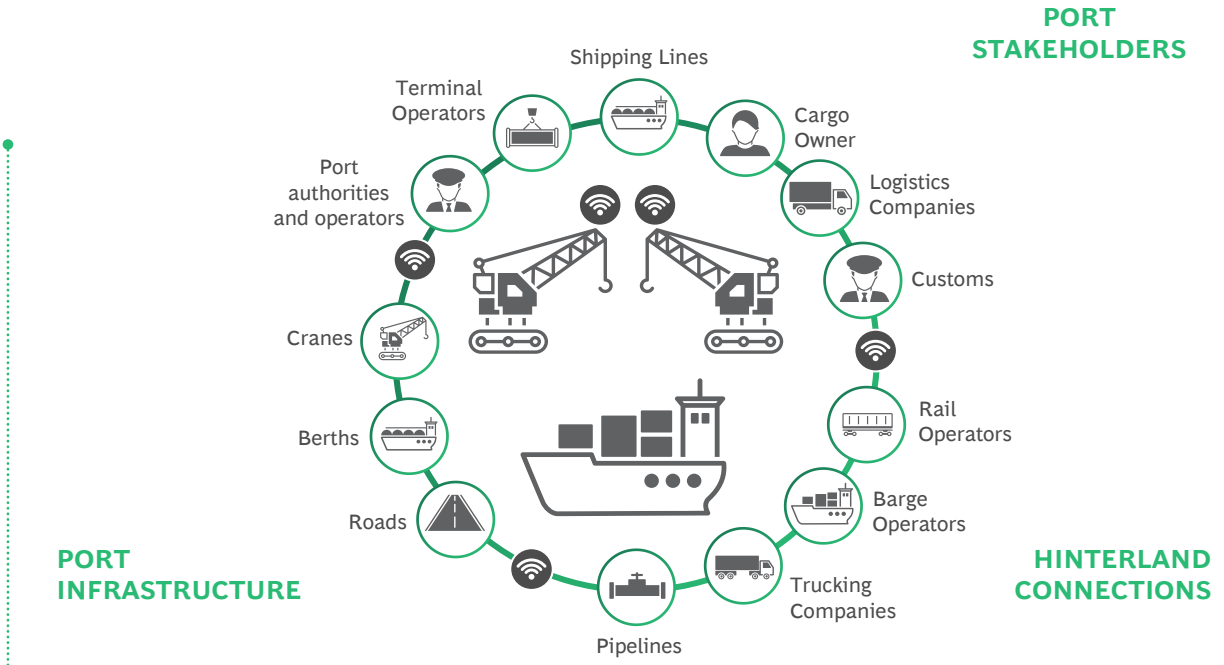
Ability of each Major Port to successfully meet digital challenges would improve substantially with the institution of a centralized **Digital Centre of Excellence** (**DCoE**) for proper e-governance.

DCoE will improve cross-port collaboration and drive ability to scale benefits for prioritized technology initiatives. It will be mandated to guide Major Ports in expediting their digital maturity on key components like ERP, digital applications and network infrastructure.

DCoE will be part of the Indian Ports Association (IPA) and act as a central authority to drive digital transformation of Major ports. It will primarily focus on following goals –

1. Standardization of technology core components (e.g. PCS 1x, NLP Marine, EBS, etc.)
2. Acceleration in adoption of digital solutions (e.g. "must-have" solutions across ports)
3. Collaboration with industry to develop new technologies
4. Cyber security and compliance across Major Ports

Exhibit 3.4 | Global Smart Ports integrating all stakeholders in a connected ecosystem



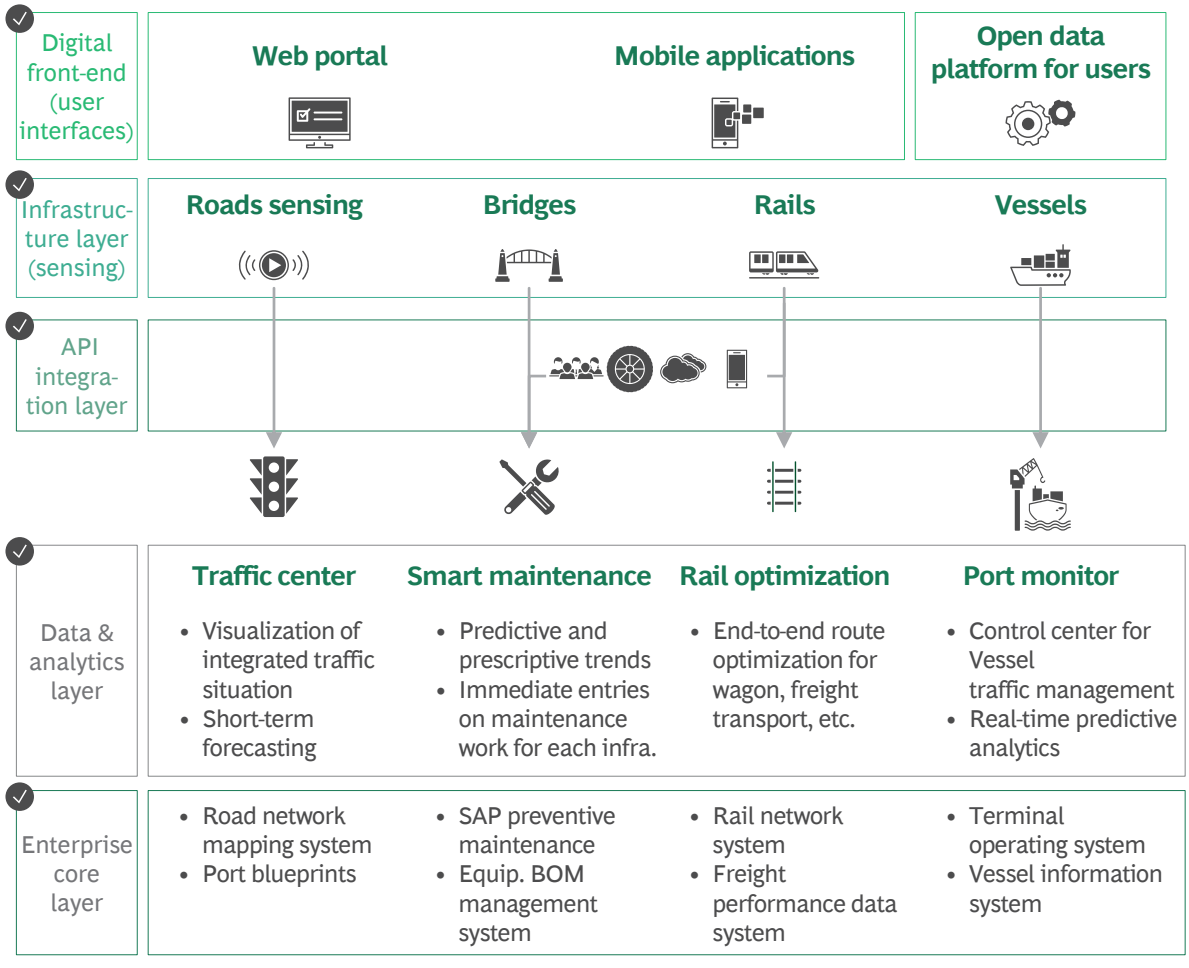
Source: Expert discussions

Information Box 3.4

Port of Hamburg has adopted a range of new technologies including the use of robotics for container handling, drones to fulfil ship-to-shore deliveries, undertake terminal security, and the use of data analytics to simulate port operations and improve performance.

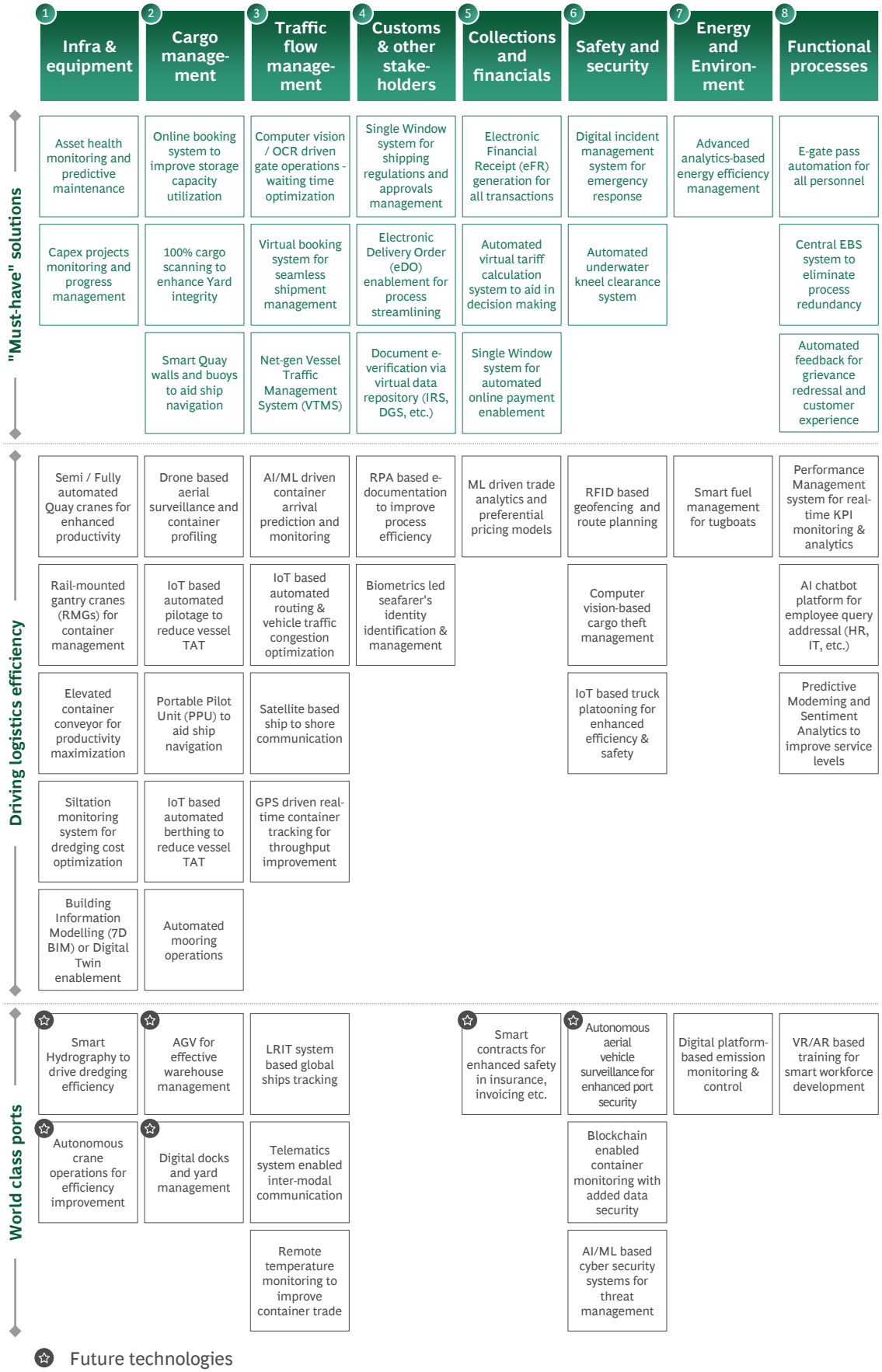
Port recently enabled an integrated community platform across maritime stakeholders like shipping companies, agents, terminal operators and other service providers for exchanging information in real-time such as port calls, weather information, water depths, admission policies, departure times, etc.

The platform provides a strong digital backbone through a robust infrastructure and enterprise systems core layer and integration of other layers.



Source: Hamburg port SmartPORT project

Exhibit 3.5 Prioritized digital solutions for Indian ports



Source: TA 3 group discussions

3.4 Ports Functional Processes Digitization

Digitization of functional processes will be critical for the Indian Major Ports in the future. To enhance business processes efficiency, there is a need of collaborative transformation and Business Process Re-engineering (BPR).

Faster and efficient digital processes are bound to bring in operational efficiencies (Illustration in Information Box 3.5).

Initiative 3.3 Implement Enterprise Business System (EBS) to simplify and digitize processes across Major Ports

Enterprise Business System combines existing systems and digitally upgrade them to enable a standardized and connected ecosystem within Major Ports (Exhibit 3.6). Proposed EBS will comprise of three core solution components –

1. Port Operations system
2. Standard Enterprise Resource Planning (ERP) system
3. Auxiliary Systems (e.g. hospital, document management, etc.)

Information Box 3.5

Digitized Port Information Booklet (PIB)

PIB is generally written for all shipping lines looking to call at ports. Ports can receive up to 50,000 to 60,000 different ship types and the global shipping industry operates in a network of up to 9,000 different ports[4]. In order to achieve optimization of both ports and shipping, a minimum set of standards are needed to connect all parties. Indian ports need to develop and regularly update PIB for improved customer experience. PIB report shall be made available on each port website and automatically sent to customer during order registration. Few mandatory sections to be covered in each PIB to provide one-stop-solution to customers are as follows:

1	General port information and port performance	8	Pilotage Guidelines and Procedures
2	Rules & regulations	9	Port safety
3	Arrival/departure checklist	10	Nautical services
4	Vessel acceptance guidelines	11	Port Clearances and Reporting
5	Required documentation	12	IMO adopted separation schemes
6	Weather and tidal information	13	Port inspection and port services
7	Guide to VHF communication	14	Details of chart agents

EBS will integrate with PCS1x and other retained applications of Major Ports (Exhibit 3.7). Enterprise Business System will help modernize the existing port IT infrastructure (computing devices, network equipment, etc.) and enable the migration of data storage to cloud services. It will aim to digitize most processes thus making port operations highly efficient.

The suggested operating model and roles and responsibilities for each level of hierarchy will be defined so that the activities can be performed without any ambiguity and duplication. Broad features of the EBS implementation are mentioned below:

- Design and Development of latest ERP application along with modules for port operations and several other niche applications for portal, hospital, etc.
- Modernization of the existing port IT infrastructure by procurement and

4 Drewry Maritime report

deployment of latest end user computing devices along with necessary network equipment at each port

Cloud services enablement leading to scalability and cost-effectiveness

Adherence to all the standards published by the Ministry of Electronics and Information Technology, Government of India

Interface between the prevalent legacy systems at the port and future systems

State-of-the art Port Command Centre (PCC) working in fully automated environment and handling feeds from CCTV, VTMS, etc. for video surveillance, emergency response activities and port operations management

It is envisioned to develop a world class port ecosystem that is transparent, uses technology to achieve strategic business objectives and integrates seamlessly with prevalent systems and devices. Expected benefits from EBS are as follows:

	Benefits in Port Operations		Benefits in Port Administration
1	Reduction in physical interaction	1	Ease in inter department communication
2	Reduction in multiple data entry	2	Easy access to employee information
3	Ease in fetching information	3	Simplified workflow for employee service requests
4	Reduction in paper workflow	4	Reduction in paper workflow
5	Reduction in document verification	5	Ease in information retrieval
6	Access to near real-time information	6	Reduction in effort with elimination of duplicate workflows
7	Elimination of duplicate workflows	7	Reduction in Employee grievance
8	Centralized system for monitoring and handling services		
9	Adherence to service delivery timelines		
10	Effective tracking of activities of port customers		
11	Ease in communication with various departments		
12	Improved decision-making process		

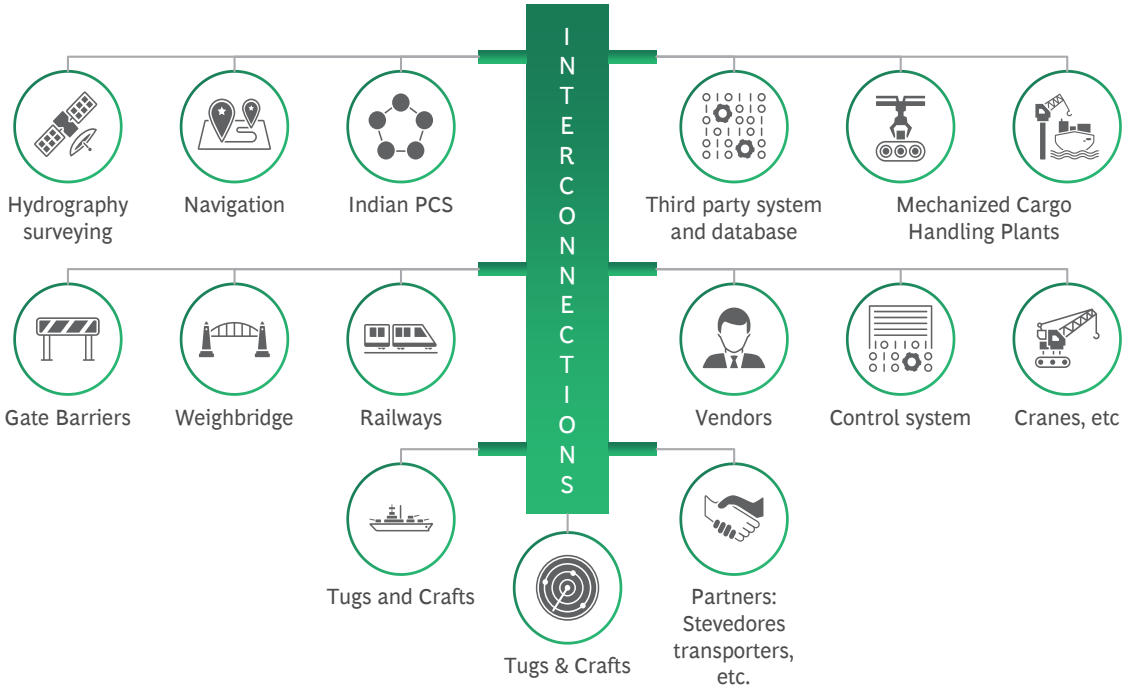
Key requirement of any large-scale transformation is to establish a rigorous program management practice. A set of tools and processes have been envisaged to enable a strong program management rigor in the port transformation projects (Exhibit 3.8).

Major Ports shall adopt a two-step approach to setting up best-in-class system-based monitoring system. In short-term, existing Digital PMO tools in MoPSW (Unnati, Sagarunnati, etc.) shall be leveraged and pursued rigorously to enable real time cross-port tracking. In the long-term, as functional processes get standardized with EBS across ports, Major Ports shall drive towards an integrated single version PMO through EBS systems across port departments (Exhibit 3.9).

The ERP system will play a key role in enabling and sustaining Major Port's businesses by bringing greater efficiency and confidence and lead to multiplier effects.

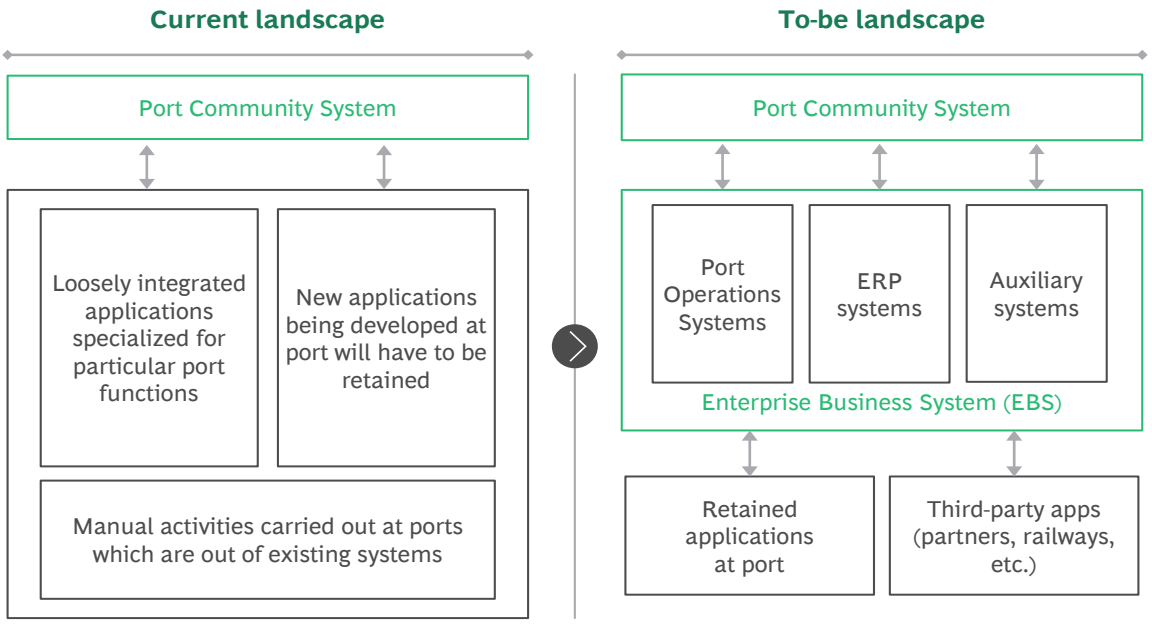
As a next step, IPA shall include other Major Ports under EBS to bring all ports towards common of processes and promote standardization in port operations.

Exhibit 3.6 | Connected ecosystem within ports



Source: TA 2 group discussions

Exhibit 3.7 | EBS integrated system landscape



Source: TA 4 group discussions

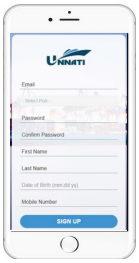
Exhibit 3.8 | Key tenets of Digital Program Management

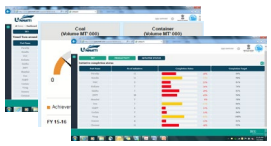
1	Digital PMO tool	Tool will enable automation of performance monitoring and tracking the productivity and turnaround time improvement in the Major ports.
2	Targets for key performance metrics	Dashboards will be maintained on key metrics and time-defined targets. Targets shall be set for each port through discussions with the respective port teams.
3	Structured monthly reviews at the ministry	Mechanism shall be set up with MoPSW to ensure that the identified initiatives are implemented in time.
4	Timely escalation and issue resolution	Review system shall ensure timely escalation of any issue to enable quick resolution. The escalation can range from the senior leadership in the respective ports to the MoPSW based on scope and criticality of the issues.
5	Weekly pulse checks and tiered weekly reviews with port authorities	Weekly pulse checks and reviews of the chartered steps with port authorities are required to enable quick course corrections as and when required.
6	Employee training and capability building	Employee trainings with extensive handholding shall be done to help the port personnel become conversant with project implementation.

Exhibit 3.9 | Approach to system-based performance monitoring system

Short-term: Leverage existing Digital PMO tool

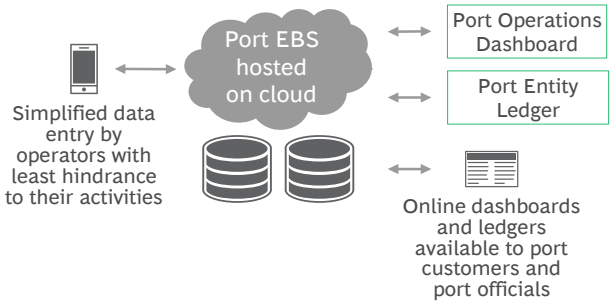
- Digital PMO Tool developed and deployed to enable real time cross port tracking; each port to revive and leverage existing platform
- Transparent real-time monitoring of standardized parameters
- Progress of all 12 ports in single screen with flags
- Ports upload data template they maintain into the app





Long-term: Drive integrated PMO via EBS system

- Single version of truth across port departments
- Simplified data entry by operators with least hindrance
- Online dashboards and ledgers available to port customers and port officials
- Quarterly milestones and tracking for projects / cargo targets
- Integrated workflows across departments eliminating redundancy for ports



All ports to standardize KPI measurement & ensure 100% compliance to digital PMO system

Source: TA 2 group discussions

3.5 Digitization in Other Maritime Areas

Initiative 3.4: Implement unified ship e-registration portal for ease of vessel registration and other measures to drive EoDB in shipping

High degree of manual interventions is a key challenge in the registration process for Indian flagged ships. Currently, Indian ships can be registered only at eight notified ports under MS Act, 1958. In contrast, several other countries are now adopting E-registration systems.

Several initiatives have been identified to streamline ship registration and improve EoDB in maritime activities in India:

1. **Single Unified Web Portal:** A single unified web portal is recommended for digitization of ship registration processes (Exhibit 3.10) with the following key features:
   - Choice of port of registry and single platform for all registrars under DGS
   - Facility to accept documents online
   - An application status tracking mechanism

United States of America – New digital Expedited Registration Process (ERP)

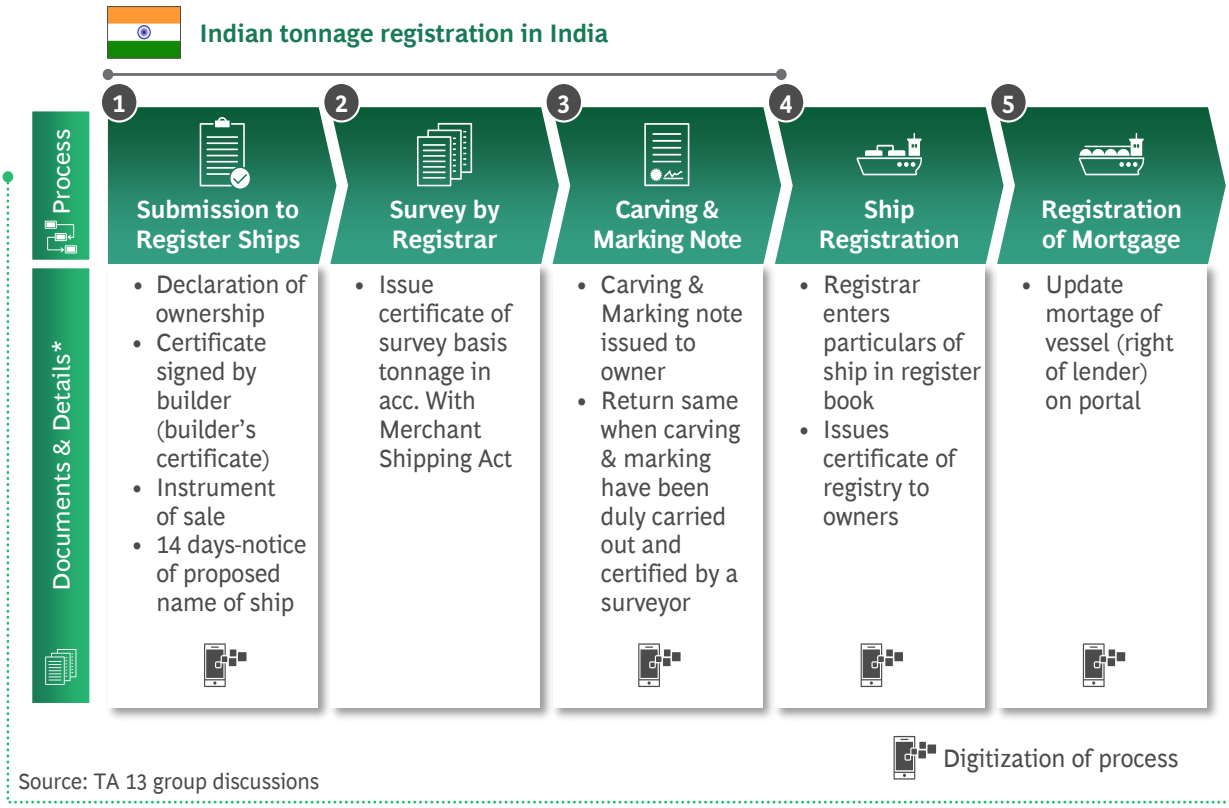
Singapore - Advanced block-chain based ship registration system called International E-Registry of Ships (IERS)

Greece – an E-registry portal for private and professional ships

- A complete profile of registered vessels including tonnage, owner data, etc.
- Integration with PCS, Mercantile Marine Department & DGS central data base

2. **Augmentation of DGS Website:** Revamp of the DGS website is planned to ensure all information related to ship registration is provided in a user-friendly and intuitive manner in line with global best practices. This will include information about all required forms, ship registration fee calculator, registration guide/rules, contact information, FAQs, incentives for registration in India, etc.
3. **Complaint Monitoring System:** A common platform to accumulate, monitor, and respond to all complaints across stakeholders, resulting in effective customer service
4. **Port Reception Facilities:** An e- portal (Swachh-Sagar) to implement the international regulation on port reception facilities for the vessels visiting Indian ports. Ports will register themselves in the e-portal and ships will submit their requirements online for discharging the garbage at ports. Ports will ensure final disposal of the garbage at the state approved locations and upload required certificates on the e-portal.
5. **Life Saving Appliances (LSA) Module:** Digitizing the E2E processes related to lifesaving items and LSA service providers e.g. issues related to disposal of pyrotechnics
6. **Recruitment and Placement Services License (RPSL) Module:** A centralized database of all RPSL companies to be prepared with various indicators like name of ships, directors, insurance, ILO requirements, Bank Guarantee details, etc.

Exhibit 3.10 | End to End ship registration process



Source: TA 13 group discussions

Initiative 3.5: Promote digitization of IWAI operations to increase efficiency

India needs a unified digital platform for National Waterways that augments inland waterways infrastructure to drive higher usage of waterways. A unified digital platform will result in transparent availability of information, higher stakeholder interaction, increased traffic on inland waterways, safe voyages, better communication, enhanced monitoring and increased public-private investment. Innovative technological solutions are required to bring efficiencies in the entire ecosystem of National Waterways and provide appropriate information for decision making. This unified platform shall integrate all existing systems to provide singular view of information such as:

- **NW Information System:** Web-based solution is being developed internally in IWAI to provide critical systematic and aggregated River and Navigational information related to National Waterways to various stakeholders. The proposed solution will provide detailed information such as fairway, infrastructure facility (jetties, pontoons, cargo handling equipment, storage facilities), cross river structures (bridge locations locks, barrages), connectivity at jetties, emergency services, vessel sailing plan details, etc. for various inland waterways in India. This solution will comprise of 3 systems, which are currently under development –

River Information System (RIS)

Portal for Navigational Information (PANI)

Least Available Depth Information System (LADIS)

These systems will help internal and external stakeholders better understand the key features of National Waterways and help in decision-making for the use of inland waterways. The proposed solution can provide necessary inputs for analysing movement feasibility and can be used by potential cargo owners, vessel operators, logistics players etc.

- **Cargo tracking and booking system (CAR-D & IBP Permission Portal):** A digital solution to monitor and provide information such as shipping status, cost, transit time, origin and destination, terminals, etc. for all type of cargo handled on National Waterways and Indo-Bangladesh Protocol (IBP) route

- **Platform for asset capacity sharing between LSPs:** Platform that aggregates information about vessels, cargo ships, logistics intermediaries and cargo owners to facilitate hassle-free movement through National Waterways. The platform will prevent unequal capacity utilization due to multiple operators handling various assets such as crates, ships, barges, etc.

- **Multi-Modal Integration:** The system envisages facilitating the exchange of information with other transportation bodies such as railways, ports, roadways, DFCs, etc. It will integrate with administration portals like ICEGATE, RIS, FOCAL to ensure seamless processing of information

- **Management Information and Reporting Solution (MIRS):** To monitor and analyze key processes like traffic, terminal performance and incidence management efficiently

3.6 Conclusion and summary

India has made substantial progress in improving the EoDB metrics in the last few years, and Indian ports have played an essential role in this journey. However, there is clear potential to further improve the EoDB in the shipping ecosystem by a more comprehensive integration of technology.

As mentioned above, four key initiatives have been identified for leveraging technology to enhance EoDB and operational efficiency of India's maritime ecosystem. These are:

National Logistics Portal (NLP) Marine

NLP Marine is envisaged as a digital single window platform for all Export-Import stakeholders (ports, shipping lines, regulatory bodies, service providers, etc.). It will enable E2E digital transactions and online payment mechanisms for Indian maritime sector.

Digital-led "Smart Ports"

50 solutions / use-cases have been identified to enable digital operations in Major Ports. Digital Centre of Excellence will be constituted to lead transformation of Major Ports to "Smart" Ports.

Enterprise Business System (EBS)

Digital platform combining existing systems with digital upgrades to enable a standardized and connected ecosystem for within Major Ports

Maritime Functional Processes Digitization

E2E digitization will extend to providing digital registration and certification for Indian-flagged ships and a digital platform for national waterways.

As part of Vision 2030, globally benchmarked targets have been defined to enhance EoDB and achieve high operational efficiency through technology. In addition to reaching benchmark levels in these initiatives, achievement of targets is expected to help Major ports save approx. INR 2000-2500 Cr in operating costs (Exhibit 3.11).

Specific initiatives and the prescribed roadmap in this chapter will further assist the achievement of our objectives. The entire ecosystem – the government, the private sector and various other stakeholders will have to join hands to achieve this vision of a tech-enabled, integrated and smart maritime sector.

Exhibit 3.11 | Vision 2030 targets to improve EoDB

Category	KPI metric	Current	Target (2030)
National Logistics Portal (NLP) Marine	India's LPI ranking in 2 categories - International shipments and tracking & tracing	40-45	Top 10
	% of EXIM transactions through NLP platform	Platform doesn't exist	>90%
E2E functional processes digitization	Standardized and digitized functional processes at Major Ports	1800+	<200 (standardized)
	% of e-registration for new vessels	–	100%
Digital-led "Smart ports"	% adoption for "Must-have" digital use cases at each port	Limited adoption	100%
	% adoption for "Logistics efficiency" digital use cases across major ports	Limited adoption	Greater than 50%

INR 2,000 – 2,500 Cr.

(additional operating surplus for ports basis efficiency increase with digital acceleration)

Source: TA group discussions

CHAPTER 4

Strengthen Policy & Institutional Framework

Strengthen Policy & Institutional Framework

4.1 Introduction

India represents one of the largest maritime industries with many sub-sectors and stakeholders like Shipyards, Shipping lines, Ports, Sea Farers, trade bodies, Maritime institutes etc. being part of the ecosystem. Moreover, 12 Major ports and 200+ Non-major ports in India are governed by individual Port Authorities and State Maritime Boards. Private participation in Maritime sector has increased over the last 15 years, as example, ~30% berths are under PPP model now across ports. However, disputes still impact the sector necessitating the need for strengthened agreements and targeted push for future adoption of PPP in other port operations.

In other maritime sub sectors like shipping, enabling provisions are required to drive targeted objectives. For instance, Indian Flag vessel tonnage is ~12.7 Mn tons pegging India at a global ranking of 17. This is primarily driven by lack of adequate fiscal support for vessel builders and owners as well as limited support for lending in shipping sector. There is a need for introduction of more enabling provisions under Merchant Shipping Bill and other fiscal measures to facilitate Indian tonnage.

In order to drive interventions under MIV 2030 across various sub sectors, interventions are required in four key buckets:

1. **Improving Governance & coordination b/w stakeholders –** Monitoring, regulation and standardization across ports by setting up central bodies under revamped legislations and enhancing the capabilities of existing association (Indian Ports Association) to drive centralization and standardization
2. **Strengthen MCA & promote PPP -** Increase private participation in the sector by strengthening model concession agreements, providing infrastructure status to ships and employing PPP across additional port operations
3. **Amendments to existing shipping legislation -** Make amendments to Merchant Shipping Bill and Lighthouse and Light ship Act and drive transparency
4. **Fiscal Support & financial resilience –** Establishing fund for easy access to working capital and employing other fiscal policy support measures like additional incentives (e.g. tax exemptions, deferred taxation, etc.) and promoting non-conventional revenue sources for ports

4.2 Improving Governance mechanisms

Sector governance can receive a fillip through establishing new / strengthening existing institutions. Central government has already taken multiple initiatives like Major Port Authorities Act 2021 which enables Major ports to move from a service model to a land-lord model.

Discussions with stakeholders and international benchmarking (Information box 4.1) revealed intervention areas to address lack of a centralized body for national level planning of port creation, and lack of central body for regulation across Major & Non-Major ports in the country.

Strengthening of existing bodies like Indian Ports Association and setting up pan maritime sector agencies on the lines of MAC NET, Japan Maritime Center will also help in bringing together stakeholders on a common platform and addressing issues in a scalable manner.

Initiative 4.1: Implementing initiatives under Major Port Authorities Act 2021 to enhance governance of Major ports

Major Port Authorities Act 2021 enables Major ports to transform effectively for the future. Key areas to be implemented on the ground as per the Major Port Authorities Act 2021 are:

1. Constitution and composition of Board of Major Port Authority in place of the Board of Trustees

2. Enabling the Board to –
   - Frame the scales of rates for assets usage and services available
   - Use property, assets and funds as it may deem fit for the benefit of respective Major Port
   - Create master plan for any development or infrastructure (established or proposed) within port limits

3. Constituting an Adjudicatory Board for adjudication of any disputes or claims among Major Ports, Public Private Partnership (PPP) concessionaires and captive users

4. Removing Tariff Authority for Major Ports (TAMP) and the powers of tariff fixation to be given to Port Authorities based on the prevailing market conditions

5. Empowering the Board of Major Port Authority to raise loans in any currency and issue securities for capital expenditure and working capital requirements

6. Retaining the right of the Central Government
   - To order survey or examination of the works of the Major Port Authority
   - To take over the management of the Major Port Authority in specific circumstances of national interest
   - To issue directions to every Major Port Authority on matters of policy

Information Box 4.1

Australia | NPS formulated at central level for development and governance of 30+ ports across states
National ports strategy covers both bulk commodity ports and container ports, identifying:

- Future infrastructure requirements of Australia's ports, including road and rail links
- Plans for relevant ports and ensuring plans can be executed
- Ways to improve land planning & corridor preservation
- Ways to improving landside efficiency, reliability, security & safety of container ports
- Most effective regulatory and governance frameworks
- Promoting clarity, transparency and accountability

Australia has 30+ key ports governed across states

Initiative 4.2: Re-structuring existing Indian Ports Association

Indian Ports Association (IPA) acts as a nodal agency with expertise in selected areas for all Major Ports. For instance, IPA provides oversight on:

- Monitoring of performance indicators, equipment utilization and progress of development projects
- Co-ordination b/w Government and Major Ports for long-term vision and annual plans formulation
- Managing techno-economic feasibility studies for addition / upgradation of ports / port facilities
- One-stop documentation center related to port planning, operations and management, information technology, etc.
- Co-ordination with international organizations like IAPH, World Bank, European Union, UNCTAD, ADB etc.

However, today there is limited central coordination resulting in minimal scale benefits for Major Ports. Major ports can unlock value through:

- Coordinate & centralize business development efforts
- Coordination in project planning
- Standardization in technology usage and data exchange
- Standardized processes across ports

It is imperative to restructure Indian Ports Association across 8 key areas to drive centralization, standardization and development across Major ports (Exhibit 4.1):

Initiative 4.3: Indian Ports Bill for structured growth of port sector & investor confidence

Indian Ports Bill will provide a regulator for structured and sustainable growth of port sector. Regulator under the bill will oversee key aspects across Major & Non-Major ports.

Initiative 4.4: Setting up 'India Maritime Centre' unifying various maritime sub sectors

India maritime sector has an expansive network of stakeholders spread across various sub sectors (Exhibit 4.2)

Exhibit 4.1 | Key areas of coordination across Major Ports

	Area	Key activities
1	**Planning & advisory**	• Develop vision and plans for development of ports • Conduct national prospective planning for port led industrialization • Plans for development of cargo movement to hinterland
2	**Technical advisory**	• Establish a technical cell at central level to provide advisory to ports
3	**Projects & Business Development**	• Conduct centralized investor outreach and marketing for promoting port-land industrialization & centralized BD • Serve as a central Investment facilitation center –a single point of contact for handholding investors till implementation • Set detailed guidelines for estate development & management
4	**Monitoring & feedback**	• Develop centralized performance dashboard and KPIs to track port performance
5	**Implementation & centers of excellence**	• Develop and provide consultancy or management services for ports (create and leverage common pool of consultants/ experts for different work undertaken by major ports) • Develop Digital Center of Excellence to drive transition of Indian ports to Smart ports
6	**Large Procurement**	• Develop approaches for maximizing procurement efficiency only for large contracts
7	**HR & training for Leadership**	• Design & implement recruitment (HR) policy across ports for leadership level (e.g. officers & above) • Design & establish centralized training & skill development programs for leadership level (e.g. officers and above)
8	**Standardization**	• Undertake creation of SOPs related to operations etc.

Exhibit 4.2 | Indian Maritime Industry has an expansive set of stakeholders

Multiple sub sectors within maritime sector

Shipyards	Ship owners	Ports	CFSs
Trade Assoc.	Sea Farers	CHAs	Trade bodies
Marine Institutes	Trans-porters Assoc.	Maritime Supplier ecosystem	Regulatory bodies
Select Financial Institutions		Select Environment research institutes	

Marine Ecosystem

Expansive network of stakeholders across sectors

- 25+ Operational Shipyards
- 200+ Notified Minor Ports
- 40+ Ship owners
- 200k+ Sea Farers
- 13 Major Ports
- 100+ Marine Institutes

Global benchmarking identified organizations like MAC NET, Japan Maritime Center which are a common platform for maritime stakeholders in those respective countries (Exhibit 4.3 and 4.4)

MAC NET is a Not for profit independent association, founded in 2015 in Korea. Prior to MAC NET, there were several independent organizations driving efforts. MAC NET unified 30+ organizations & associations across the maritime industry in South Korea. Today it is an integral Part of Korea's delegation to international forums and also organizes flagship events, symposiums creating visibility for Korean industry globally

MAC NET acts as a representative of South Korean national interests with the mission statement of 'A power maritime nation together as one'. It has as technical working groups focusing on specific topics, enabling it to become a thought leader. It is independent and professionally managed and generates revenue for its operations from Govt. grants, membership fees and events

India needs a similar maritime body to drive unified approach to maritime policy across different sub sectors and focus on building an integrated Indian Maritime ecosystem. This body will also help in achieving unified representation of Indian Maritime sector at IMO and create global visibility along with a strong brand for Indian maritime sector.

India maritime center will have a dual focused mandate both globally and locally. Global focus will consist of - Strengthening participation in IMO and relationships with Global Maritime community; Creating Global visibility and market opportunities for overall Maritime cluster.

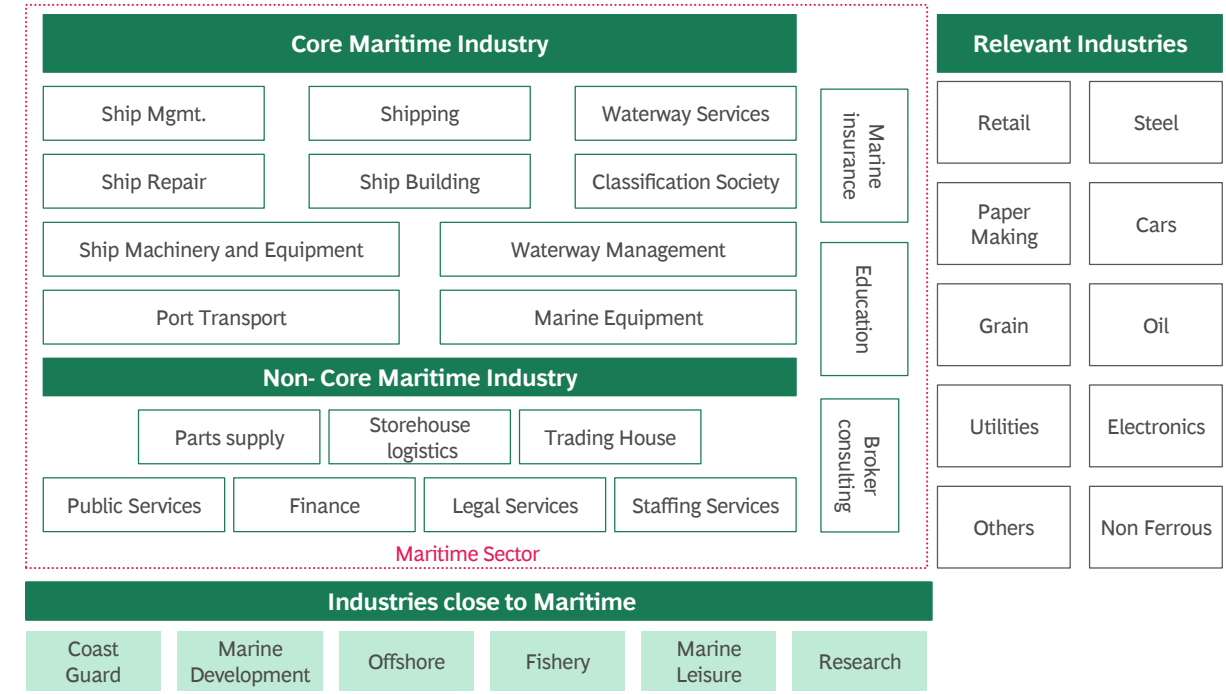
Local focus will consist of - improving overall Maritime competitiveness through synchronized efforts across domestic subsectors and development strategic sectors such as cruise; Advise on policy frameworks, thought leadership and research on forward looking areas.

India Maritime centre will have experts / advisors as part of working groups/ committees, supported by a Secretariat for day to day operations (Exhibit 4.5) and may rely on public / private grants for 2-3 years; critical to self-sustain over medium term (Exhibit 4.6).

Exhibit 4.3 | MAC NET represents diverse stakeholders from the entire Korean maritime ecosystem

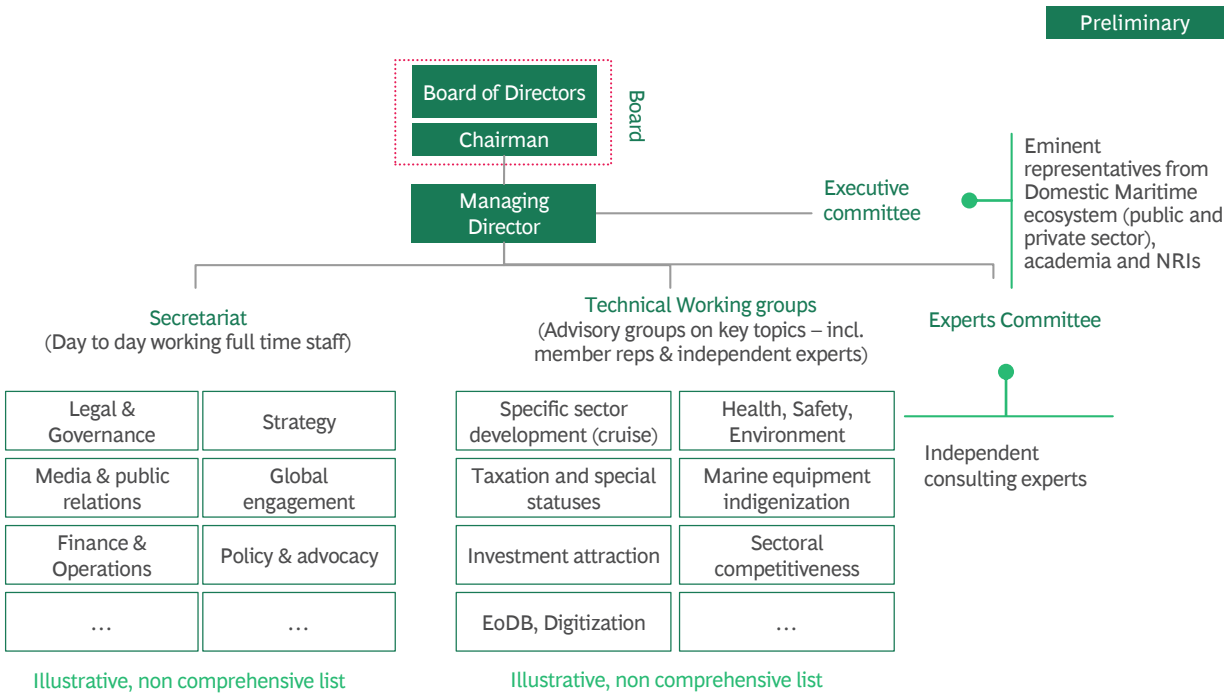
Source: MAC NET website

Exhibit 4.4 | JMC acts as a unified body representing the entire maritime sector in Japan



Source: JMC website

Exhibit 4.5 | Maritime Centre structure (preliminary)



Source: Industry research, Expert inputs

Exhibit 4.6 | Potential revenue streams for Maritime Centre

		Description	Phase 1: (0–3 years)	Phase 2: (3+ years)
1	Membership Fees	• Three categories of members with annual fees based on revenue/income (Details later)	✓	✓
2	Event Sponsorship and related revenues	• Sponsorship of national/global events/ business directory, admission fees, sale of booth space	✓	✓
3	Capability building and certifications	• Training/ advisory services independently or in association with industry/academia		✓
4	Data monetization	• Key policies & sector information (Ex-Gratia)	✓	✓
5	Research & advisory services	• Research from technical working groups/ collaboration with research partners (E.g. Clarksons)	✓	✓
6	Public & Private sector grants	• Project specific and gap-financing grants	✓	✓ (Project Specific)
7	Project Management Services	• DPRs of marine infrastructure projects, shipyards, site survey and testing etc.		✓

To determine specific revenue pools against these streams, a DPR study needs to be conducted

✓ Indicative suitability

Source: Industry research, Expert inputs

Exhibit 4.7 | Key issues across PPP concessions today

Issues[1]	% of cases
Delay in meeting Condition Precedents & Project enablers[2]	20%
Changes in commercial viability, tariff & royalty/ revenue share issues	30%
Lease rent related issues[4]	20%
Issues related to payment of service tax, service charge, interest, advance charge, etc.[5]	15%
Other issues	15%
Overall	**100%**

Note:
1. Above assessment is for detailed cases under litigation/ stressed projects across Chennai, Vishakapatnam, VoCPT, DPT, MoPT and JNPT
2. Example: Delays in site handover, clearances, dredging depth not achieved, etc.
3. Example: license fee escalation, past surplus on BOT operations, change in revenue share, challenging TAMP order
4. Example: Revision of lease rent
5. Example: Payment of service tax, service charge, interest, advance charge, etc.

Source: Port Strategy documents

4.3 Strengthen MCA & promote PPP

Significant progress has been made with respect to PPP in the ports sector in the last 15 years. Approx. 28% of berths are under PPP mode today and Major ports envisage to move towards landlord model in years to come. In order to facilitate that, interventions are required - Strengthen existing MCA documents, introduce newer PPP modes to facilitate private sector investment to the sector

Initiative 4.5: Revise existing Model Concession Agreement to improve the contracting process & attract private investment

5 key issue types exist today (Exhibit 4.7) across PPP concessions which need to be addressed in order to promote PPP in future

Key intervention buckets identified as part of MIV 2030 discussions to streamline existing MCA:

#	Area	Potential interventions
1	Clear obligations & timelines	• Defines clear timelines for compliance and maximum possible extension of conditions precedent to be met by the Authority (e.g. Environmental clearance) • Add provision to provide Support infrastructure: Connectivity infrastructure (e.g. road, rail), Required dredging for the facility • Timelines for fulfilling CPs related to financial closure by the Concessionaire to be clearly defined • Introduce 'Deemed termination' clause in case condition precedents are not met and appointed date does not occur before the 1st anniversary from date of agreement or extended period
2	Managing extreme impact on commercial viability	• Define specific triggers in the concession which may require re-adjustment of financial parameters • Evaluate options available to deal with changed scenarios - Re-negotiation of royalty charges to make economics viable - Change in commodity rules to allow berth to switch cargo - Exit/ terminate agreement • Establish a committee for review of contract constituting of experts from: - Port Trust, Concessionaire, trade & industry and the Govt., Adjudicatory Board representation
3	Dispute resolution	• Introduce ability for dispute resolution through 'Conciliation' as part of SAROD-ports framework • Establish clear monetary limits for further appeals to improve the arbitration process
4	Minimum performance for operators	• Revamp Appendix 15 of MCA by addition of new KPI parameters / revising existing KPI to include minimum performance standards to drive world class operations (KPIs to be customized basis port context)
5	Additional infrastructure and cost	• Define a framework to determine rates for additional infrastructure that can be offered to PPP operator - Additional land (e.g. back-up land) - Yard space - Evacuation infrastructure (e.g. additional rakes)
6	Qualification parameters in the bidding document	• Expand the definition of Core Sector to include: - Shipping lines, Green field projects with port structures development and port infrastructure development

Initiative 4.6: Promoting captive jetties

Interventions are also planned to streamline captive jetty policy in the country (Exhibit 4.8).

Initiative 4.7: Introduce new models to promote PPP in ports sector ecosystem

Global ports have undertaken multiple forms of private participation for diff. infrastructure and services across port value chain. These PPP models extend across:

- End to end Berth development & operations
- Berth operations only with existing equipment
- Equipment only (cranes, tugs, etc.)
- W/H & Industrial land services (storage, reefer, etc.)
  - ¬ Warehousing and storage facilities
  - ¬ Reefer facilities
  - ¬ Yard management

Exhibit 4.8 | Key recommendations for Captive Jetty Policy

Element	Suggested change
1 Cargo change Issues: • Dynamic business environment • However, no provisions in the policy exist today to deal with the need for cargo change	1.1 Provision to allow conversion of captive jetty to a multi-user terminal or allowed to handle different cargo for specific conditions: 1.1.1 Banning of certain raw material (import / export) 1.1.2 Alternative is found within country 1.1.3 Change in cargo composition over the years
	1.2 Provision to allow such request after min lock-in of 7 years from COD 1.2.1 Exception in case of force majeure event / change in law
	1.3 Review/ change original bid parameters such as 1.3.1 Minimum guaranteed cargo 1.3.2 Allowing 3rd party cargo 1.3.3 Royalty
2 Capacity addition Issues: • No provisions in the policy exist today to enable capacity addition	2.1 Provision to allow request for construction of additional berth/ jetty as an extension of existing berth / facility for specific conditions: 2.1.1 Increase in demand due to planned capacity addition
3 Utilization of jetty Issues: • Cap on non-captive cargo volume at 30% can only be relaxed under exceptional circumstances	3.1 Provision to allow relaxation of 30% cap in handling of third party /non-captive cargo under specific conditions: 3.1.1 Banning/ restrictions on import of certain captive cargo 3.1.2 Restrictions on export of certain captive cargo 3.1.3 Alternative material to captive cargo found within country 3.1.4 Change in cargo composition over the years
4 Additional Land allotment Issues: • Additional land rates are twice the SOR	4.1 Provision to offer additional land at 1.2x the rate of scale of rates as applicable at the time of giving additional land 4.1.1 Fees is paid on half yearly/ yearly basis
	4.2 Escalation of charges with respect to port premises or additional land, utilities or services may be stipulated upfront in the bid documents
5 Bidding eligibility Issues: • PDIs having minimum Net Worth equivalent to 50% of the Estimated Project are eligible for RfQ	5.1 Allow PDIs having minimum Net Worth equivalent to 30% of the Estimated Project to participate in the bidding process

- Other services (dredging, towage, etc.)
  - ¬ Pilotage and towage services
  - ¬ Dredging services
  - ¬ Dry docking and ship repair facilities

Leading maritime nations have defined a precise PPP strategy customized to type of port and context. For instance, Philippines Port Authority's (PPA) framework for driving private participation (Exhibit 4.9).

There is a need to define a tier wise strategy for Indian ports to facilitate movement towards landlord model basis a structured 10 to 15-year master planning exercise across ports. Two new PPP models that Major Ports can adopt basis cargo potential and CAPEX requirements are articulated in Exhibit 4.10

Apart from this, many port ecosystem activities like towage, dredging can leverage PPP models to unlock efficiency. Across the world, ports are increasingly using private players for towage services. Ports sign license contracts with to towage service operators and operators directly charge vessel owners for the service. For example - Svitzer, offers towage and marine solutions to customers across 30+ countries via contracts with Port Authorities (Exhibit 4.11)

Major ports in India are facing multiple challenges related to high maintenance costs, frequent breakdowns due to lack of proper up-keep and maintenance. It is proposed to encourage PPP in towage through a well-defined commercial model which allows private towage companies to offer services to shipowners and charge them directly through clear publishing of tariffs.

Dredging is another area where PPP can be evaluated to drive efficiencies. Historically, significant expenditure has been incurred on dredging and large quantities of dredged material extracted. For example[1], between 2012-17, 126.8 Mn cum of capital dredging and INR 34.2 Bn expenditure was incurred while in maintenance dredging, 360Mn cum of material and INR 42.1 Bn expenditure was incurred.

Globally contract bundling and traffic-linked model leveraged to drive greater private participation. Ports combine capital & maintenance dredging in multi-year contracts. For example, Port of Bahia Blanca, Argentina awarded EUR 90 Mn contract to Boskalis and Jan De Nul where scope includes capital dredging and 5-year maintenance dredging. Similarly, Port of Santos, Brazil awarded EUR 110 Mn contract to Van Oord for capital & maintenance dredging.

Exhibit 4.9 | Philippines Port Authority's (PPA) framework for driving private participation

Investment type of the PPA and its Terminal Operators

Investment type	Sample capital investment	Tier 1 Full terminal Concession	Tier 2	Tier 3	Tier 4	Tier 5 Pure O&M	Tier 6 PPA-STU Port
Physical undersea infra	Dredging & harbor basin	Port Operator	PPA	PPA	PPA	PPA	PPA
Physical landslide infra	Berths, land reclamation	Port Operator	Port Operator	PPA	PPA	PPA	PPA
Above ground semi-fixtures	Material handling equipment & mechanization	Port Operator	Port Operator	Port Operator	PPA	PPA	PPA
Above ground fixtures	Terminal building & infra	Port Operator	Port Operator	Port Operator	Port Operator	PPA	PPA
Mobile handling equipment	Evacuation equipment (Forklifts, trucks, conveyor)	Port Operator	Port Operator	Port Operator	Port Operator	Port Operator	PPA

1 Discussion with Major Ports; Press search

Exhibit 4.10 | Two new PPP models for Ports

	Equip, operate & transfer (EOT) model	Operate & maintain (O&M) model on fees/annuity
Scope of work	Berth exists; PPP operator to install and operate equipment	Berth & equipment exist; PPP to operate equipment
Capex	Medium	Low
Cargo Volume	Medium-High	Low-Medium
Payment to authority	Fixed fee/ton	Min Fixed fee + performance fee
Timeline	10-15 years	5-10 years
Potential opportunities	25-30 (Preliminary)	Existing berth with mechanization

Need to build MCA for these models

Exhibit 4.11 | PPP in towage services

Svitzer is an international leader in providing towage and other marine solutions to ports across the globe

SVITZER

Harbor & terminal services include:

- Berthing
- Unberthing
- Maneuvering
- Stand-by services
- Jetty/ buoy maintenance
- Ice breaking
- Pilotage

Ports in Australia use towage services of Svitzer

~25 ports in Australia allow Svitzer to offer towage services at their ports

Example:

- Port of Sydney signed a non-exclusive license agreement with Svitzer to allow towage services at the port
- Svitzer charges tug tariffs as per their tariff schedule for the port (published on their website)
- Svitzer maintains contracts with vessel owners/ agents and directly collect tariff from them for the services

Port operators are also recovering costs basis traffic flow in channel over 15-25 years. For example, in Puerto San Martin river, Jan De Nul & Empera JV charge toll of USD 1/ NRT on ships over 10-year dredging contract.

Indian Major ports need to explore PPP in dredging models so that the operator can recover costs linked to traffic in channel as well bundling of dredging contracts across Major Ports to ensure a larger contract value and attract international players

Initiative 4.8: Ensure adequate provisions in the Land Use Policy to support various collaboration models (State Govt., industrial bodies, Central govt, private developers)

Port led industrialization is very critical for developing economies. Advanced maritime nations have used port led industrialization aggressively in the last few decades to drive development. An integrated and comprehensive plan for port led industrialization in India need to be developed combining the growth potential of port-linked industries with the competitive location for each industry.

Ports can leverage central & state govt. Programs for example – NICDC will drive industrial development program with states.

5 Major ports impacted by the Industrial freight corridors: Mumbai, Cochin, Chennai, Vishakapatnam, Kolkata, can evaluate to form SPVs with NICDIT by offering land for port-led industrialization.

State industrial corporations are forming JVs to drive industrialization. For example, JVs formed by APIIC (Exhibit 4.12)

Major ports can work with state industrial corporations to setup SPV and conduct joint development of port land. This would help ensure investors get benefit of state industrial policies along with ease of doing business.

4 models can be explored by ports for collaboration with various partners to drive port land industrialization (Section 2.5). Port land use policy is undergoing amendments and it needs to be ensured that it contains enabling provisions which will help provide more flexibility to ports and drive port land industrialization in an accelerated manner.

Exhibit 4.12 | JV formed by APIIC

Particulars of the companies wherein APIIC has invested in equity

#	Name of the project company	% holding by APIIC	Name of JV partner	Purpose of project
1	L&T Hi-tech Ltd	26%	L&T Infocity Ltd	Establishment of IT SEZ
2	Visakhapatnam Industrial Water Supply Company Ltd	49%	GVMC	SPV for providing water for Industrial use from Eleru Canal to Vishakapatnam
3	Vishakapatnam IT Park Ltd	0.49%	Infortech & L&T Infocity & VUDA	Establishment of IT office space
4	Ramky Pharma City (India) Ltd	11%	Ramky Infra Ltd.	Industrial Park for pharma sector
5	Bharatiya International SEZ Private Ltd	11.05%	Bharatiya Leathers, Delhi	SEZ for leather sector
6	Krishnapatnam International Leather Complex Pvt. Ltd	51%	LIDCAP	SPV for development of leather processing industry
7	Andhra Pradesh Gas Infra Corp. ltd.	51%	AP Genco	SPV for exploration of Gas & Oil

4.4 Amendments to existing shipping related legislation

The Make in India Order by DPIIT, as revised in June 2020 is a major step in line with the Government's Atmanirbhar Bharat Policy. Under this Order, unless specific exemption has been granted, no global tender can be issued for public procurement of goods and services, with a procurement value less than Rs. 200 crores.

However, the Indian shipping companies are unlikely to be able to make full use of this new dispensation due to lack of adequate numbers of crude carriers, goods carriers and bulk carriers flagged in India. The share of Indian ships in India's EXIM trade has steadily fallen over the years and currently is less than 10%. The operating cost of Indian ships is on an average 20% higher than foreign flagged ships. This is primarily on account of taxation, blockage of tax credits, and higher cost of capital.

Opportunity exists to address multiple areas of intervention in the existing legislation. For instance, stringent vessel registration rules lead to lower tonnage under Indian flag and there is requirement of licenses for Indian vessels as well from DG Shipping which impacts EoDB.

Initiative 4.9: Reform Merchant Shipping bill to enhance Ease of Doing Business

Various reforms are proposed for Merchant Shipping Bill as summarized in Exhibit 4.13.

Initiative 4.10: Implement specific changes in - Light House and Light ships Act

Currently, Light House charges in India are higher than leading ports and calculated based on NRT and deck cargo vs. GRT used by other ports and there are multiple systems for vessel feed information. Obligations/functions under IMO are required to be discharged by DGLL.

It is proposed to segregate role of service provider and role of regulator and simplify the method for calculation of charges by using Gross Tonnage as the basis. Rationalization of charges needs to be undertaken post benchmarking with other regional ports and its needs to be ensured that all feed from VTMS & DGLL systems flow to Long Range Tracking and Identification (LRIT) for complete visibility.

Exhibit 4.13 | Reforms in Merchant Shipping Bill

Element	Suggested change
1 Regulation of vessels Issues:	1.1 Relaxation of ownership requirement: 1.1.1 Ownership requirement for registration under Indian flag may be relaxed from 'wholly owned' to 'substantially owned[1]' 1.1.2 Ships substantially owned by LLP, OCIs may be allowed to be registered in India
	1.2 Registration of additional types of vessels: 1.2.1 Under construction vessels 1.2.2 Foreign Vessel chartered on BBCD contract by Indian entities 1.2.3 Vessels owned by Indian entities may be allowed to register out of India [Indian Controlled Tonnage] 1.2.4 All kind of sea going vessel should be registered under MS Act irrespective of size or area of operation
	1.3 Control of Stateless vessels 1.3.1 Provisions for impounding unregistered/ flagless vessels
	1.4 Ease of Business/operation of ships: 1.4.1 Registration of Indian vessels to include General Trade Licensing[4] 1.4.2 Provisions related to survey and certification of vessels may be put together in one chapter under MS Bill[5]
	1.5 Provision for Registrar of Ships 1.5.1 Make Principal Officer of the MMD and Surveyor-in-charge as registrar of ships
2 Seafarer Training & Welfare Issues:	2.1 Provisions on supervision & monitoring of maritime education & training including control on MTIs for purposes of ensuring quality of education as per STCW Convention/Code[6] by DG Shipping, GoI
	2.2 Prohibition of Maritime training in India without approval from DG Shipping
	2.3 Enforcement of award by Shipping Master without approaching the Courts
	2.4 Provisions related to signing of agreement before Shipping Master may be removed

Note:
1. Substantially owned means, ownership of more than fifty percent shares of the vessel; 2. BBC – Bareboat charter - A BBC is a contract of providing a vessel on hire for a stipulated period of time by the owner of the vessel to the charterer of the vessel; 3. Benefits: Small shipowners or entities who cannot invest a huge sum of money for purchase of vessel, may charter/hire the vessel on BBCD basis having an intention to transfer the ownership to an Indian owner, and register such vessel as an Indian vessel. This will promote tonnage under Indian flag; 4. Benefit from 1.4.1 - Indian vessels should no longer be mandated to have a license from the DG Shipping for engaging themselves in the coasting trade/ any trade of India which will provide an ease of doing business to Indian vessels. Only foreign flagged vessels should procure the license; 5. Benefit from 1.4.4 - Consolidation of provisions related to survey and certification done to provide a simple regime for convenience. The ship-owners will have single chapter/Part to look for application of regulations w.r.to survey and certification and thereby removing the ambiguity for application of law.; MMD - Mercantile Marine Department; 6. Effective monitoring of maritime training and education will lead to to grant of CoCs & CoPs in accordance with the mandate of the STCW Convention, 1978. It will enable to produce Indian seafarer with better training and competency thereby making them more skilled & competitive for international market

Exhibit 4.13 | Reforms in Merchant Shipping Bill

Element	Suggested change
2 Seafarer Training & Welfare Issues:	2.5 Recruitment of seafarers may be through only owners or registered agencies
	2.6 Provisions enabling that seafarers held in captivity (piracy) to get wages may be incorporated
	2.7 Provisions for gratuity and pension for seafarer may be made[1]
3 International conventions Issues:	3.1 Extension of Wreck Removal Convention (2007) and International Convention on Salvage to territorial waters
	3.2 Adopt the London Dumping Conventions for controlling dumping of waste into sea by ships[2]
	3.3 Incorporate provision for adherence to International Convention on Civil Liability for Bunker Oil Pollution Damage
	3.4 Incorporate provision for adherence to International Convention for the Control and Management of Ships Ballast Water and Sediments
	3.5 Incorporate MARPOL Convention's Annexure VI for Air pollution by ships
	3.6 Update provisions for adherence to International Ships and Port Security [ISPS] and International Safety Management [ISM] Code • Deals with safety and security management of Indian ships
	3.7 Incorporate provisions for adherence to International Convention Relating to Intervention on the High Seas • Deals with Oil Pollution Casualties at High seas, affecting coastal States
	3.8 Provisions on obligations of ports under implementation of FAL Convention specially related to safety and facilitation of maritime traffic and its supervision
	3.9 Provisions on obligation of State under Maritime Labour Convention like repatriation of foreign vessel etc.
4 Administration of International Conventions	4.1 Regulation of adherence to International Conventions by ports and providers of navigational aid through DG Shipping: 4.1.1 FAL Convention 4.1.2 Safety of Navigation and Navigational aid 4.1.3 Maritime Labour Convention 4.1.4 London Dumping Convention

Note:
1. Amending the Seamen's Provident Fund Act, 1966
2. London Dumping Convention to be executed over a longer time horizon – 3-4 years
The International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F)
ILO- International Labor Organization

Exhibit 4.13 | Reforms in Merchant Shipping Bill

Element	Suggested change
5 **Port Safety**	5.1 Port approved for handling dangerous cargo must have- 5.1.1 System for Audit (Periodic and Annual), Inspection (Annual) 5.1.2 Segregation of cargo depending upon compatibility based on IMDG Code
6 **Fishing vessels Issues:**	6.1 Incorporate provisions for better safety and alignment with other international standards such as : 6.1.1 Cape Town Agreement on safety and construction of vessels 6.1.2 STCW-F Convention for safety of fishermen 6.1.3 ILO Work on Fishing Convention, 2007 for basic standards for work in fishing industry
7 **Maritime Emergency & powers to issue direction Issues:**	7.1 Creation of Emergency Fund to deal with emergency situations like 7.1.1 Abandonment of ships 7.1.2 Abandonment of seafarers, replacement crew, etc.
	7.2 Powers to DG Shipping and central govt. to issue directions to • Deal with abandoned vessel such as vessel that is posing threat to safety and environment pollution • Deal with salvage of operations of ship/cargo in case such operation involves any threat to safety of life at sea and protection of environment at Indian coast/ territorial waters of India
	7.3 Provisions to deal with abandonment or deemed abandonment of seafarers or ships and replacement crew
8 **Port Environment**	8.1 Shore based Power Supply: Planning, feasibility and implementation by 2023
	8.2 Swachh Sagar: Expansion to all ports, including Ports dealing with IV vessels and Fishing vessels by 2021.
	8.3 Anchoring of vessels facing emergency situations: Provisions under MS Bill/Indian Ports Bill giving Power to DG Shipping to direct ports for accepting a vessel in emergency situations
	8.4 Environmental indicator for ports: All ports should have Environmental indicators as per IMO-Norway Green Voyage Project 2050 by 2023.

Note:
1. Regulatory requirements with respect to environmental parameters need to be executed in phase-1

4.5 Fiscal Support & financial resilience

The substantial need for increase in capacity at ports, port hinterland connectivity, ship building and ship repairing needs an increased flow of private sector capital in the sector. This must be supported by requisite policy & regulatory support and skills development along with technological upgradation. Enterprises engaged in Coastal shipping, Inland Waterways, Shipping companies, ports and jetties, ship building, and ship repairing require long-term low-cost financing. Financial incentives are required to promote investments and support them in achieving required scale.

Initiative 4.11: Create a Maritime Development Fund to provide easy access to working capital and long-term finance needs across marine sectors

From the above discussion on the challenges facing Shipping Industry it evolves that there is a need to effectively and efficiently make financing available to private sector investing in the maritime sector in the country. The proposal is to develop a Maritime Development Fund (MDF) to enable raising long term funds in the domestic and international markets. MDF would then on-lend such funds to the maritime sector at competitive rates. Funds are proposed to be utilized for financing:

- Financing support for fleet acquisition by shipping companies
- Inland Waterways operations & vessel financing
- Setting up and modernizing shipyards
- Setting up ship repair facilities
- Setting up ship building ancillary parks and design hubs
- Promoting cruise tourism
- Port led development
- Mechanization and capacity expansion of existing ports through PPP
- Setting up new ports and jetties through PPP

It is proposed to setup Maritime Development Fund with an estimated capital of INR 25,000 Cr. (INR 2500 Cr. support from GoI over 7 years). Core capital to be leveraged for Multi-lateral funds for low cost financing support. Multiple funding mechanisms—Debt, Equity, VGF and buyer credit support will be part of the fund mandate. Fund will also promote innovation & support start-ups and technology companies in the sector.

Ministry of Ports, Shipping and Waterways to finalize housing structure for MDF operationalization and establish MDF organizational structure, regulatory implications, eligibility criteria, etc.

Initiative 4.12: Extension of Tonnage Tax scheme on Inland Vessels

Currently, Development rebate under Tonnage tax scheme available to Indian shipping companies. Indian public companies operating ships are allowed to deduct amount (up-to 100% of income) from P&L under IT Act. Amount deducted used for creation of a dedicated reserve for acquisition of new ships.

It is proposed to extend Tonnage tax scheme to include inland vessels registered under Inland Vessels Act, 1917. This will catalyze investment and enhance availability of inland vessels in IWT sector

Initiative 4.13: Formulate incentives for promoting coastal shipping in India

Central govt. has already provided multiple incentives to boost coastal shipping (Exhibit 4.14)

Going forward, it is proposed to evaluate interventions like deferred taxation for investment in coastal shipping (e.g. through accelerated depreciation mechanism) etc.

Initiative 4.14: Work with Ministry of Finance (MoF) for developing dedicated policy and capacity in select commercial banks for lending in shipping sector

Multiple issues are faced by banks in lending to shipping sector

- Valuation: Issue faced in valuation and pricing of secondhand vessels
- Tenure matching: Difficulty in matching high and lows of vessel chartering and syncing loan repayment tenure
- Limited standardization: Lack of standardized policy/ regulations for evaluation and assessment of shipping finance

It is proposed to have a dedicated policy guideline in partnership with banks:

- Create and detail out Policy guideline for:
  - New/ old vessel financing
  - Chartering financing

Exhibit 4.14 | Interventions undertaken by GoI to boost coastal shipping

Licensing relaxation

- Relaxation in licensing for foreign flag vessels to transport fertilizers, agri products and EXIM containers for trans-shipment in India on coastal routes
- Licensing Relaxation for special vessel such as RO-RO, RO-pax, ODC etc

GST reduction

- GST Reduced on Bunker Fuel from 18% to 5%

Priority berthing

- Priority berthing policy for coastal vessels has been notified to reduce turnaround time for coastal vessels and improve their utilization

Discount on VRC, CRC

- Discount of minimum 40% is offered by major ports on vessel and cargo related charges to vessels carrying coastal cargo

Coastal berth scheme

- Grant-in-aid assistance to develop berths and associated infrastructure including dredging, Break-water creation, mechanization under the coastal berth scheme has been extended till 2020

- Train and build specialized inhouse teams within select banks like SBI and EXIM Bank for assessment and evaluation of shipping related proposals

Initiative 4.15: Work with MoF to extend concessional income tax rates for promotion of ship leasing activities

Global benchmarking reveals, tax incentives are being provided for ship leasing in other mature maritime nations. For example, in Hong Kong[2]:

- 0% tax rate on qualifying profits of ship lessors and ship leasing managers
- Concessional rate of 0% and 8.25% for ship leasing management activities for associated and non-associated companies respectively

Conditions: All management activities to be conducted within the border while vessel involved must be trading outside its waters

It is proposed to evaluate similar tax benefits to be extended to domestic Ship-lessors and ship management companies. Detailed proposal to be developed in consultation with Ministry of Finance (MoF)

Initiative 4.16: Collaborate with MoF to grant Infrastructure Status to Shipping Industry to enhance availability of low-cost long-term funds availability

Indian Shipping companies struggle to grow tonnage due to difficulties in accessing required finance as there is a mismatch in tenure of loan offered (5 to 10 years) vs life of vessel (30+ years). Lack of 'Infrastructure' status limit potential avenues for long-term low-cost funds for shipping making it less attractive sector. Due to financial constraints, Indian shipowners not able to order new ships to local shipyards.

It is proposed to provide 'Infrastructure' status to enable vessel operators/ shipping companies to raise long term-low cost finance. MoPSW to work with MoF to get shipping qualified as "Infrastructure"

4.6 Conclusion and Summary

In order to strengthen Policy and Institutional framework, 16 initiatives have been identified across 4 key focus areas:

1. Improving Governance & coordination b/w stakeholders

- Improve governance, monitoring and standardization across ports by setting up central bodies (Indian Maritime Centre

2 As of November 2020

Regulatory body under Indian Ports Bill)

- Enhancing the capabilities of existing association (Indian Ports Association) to drive centralization and standardization

2. Strengthen MCA & promote PPP

- Increase private participation in the sector by strengthening model concession agreements, and employing PPP across additional port operations
- Providing infrastructure status to ships

3. Amendments to existing shipping legislation

- Make amendments to Merchant Shipping Bill and Lighthouse and Light ship Act and drive transparency in shipping costs (MMT Act)

4. Fiscal Support & financial resilience

- Set-up Maritime Development Fund (MDF) for low-cost, long-term financing support to maritime sector stakeholders
- Employ additional incentives (e.g. tax exemptions, deferred taxation, etc.) and promote non-conventional revenue sources for ports

CHAPTER 5

Promote Domestic Ship Building, Repair & Recycling

Promote Domestic Ship Building, Repair & Recycling

5.1 Introduction

Global ship building market is estimated to be approx. USD 70 Billion[1], primarily dominated by China, South Korea and Japan currently. Ship building industry has been going through an extended global downturn for the past few years, with world's leading shipyards facing financial troubles due to lack of orders. With IMO 2020 Sulphur regulations and world fleet renewals, the global shipbuilding prospects have seen modest recovery. It is expected that these regulations will create significant technology requirements for both new and existing ships, leading to a positive effect for suppliers and shipyards.

During early 2000s, Indian ship building industry produced over 3,00,000+ Gross Tonnage (GT) and ranked amongst top 10 in the World. The global downturn in the shipbuilding industry significantly impacted the Indian shipyards and India's share in the Global markets has declined to less than 1%. India currently has 28 shipyards, 6 under Central Public Sector, 2 under State Governments and 20 under private Sector[2].

Global ship repair market is approx. USD 12 billion[1]. Shipyards in China, Singapore, Bahrain, Dubai and Middle East account for a major share of this market. These locations have achieved a dominant position despite higher cost of ship repair services compared to other Asian counties, largely due to the availability of a skilled workforce and the latest technology which allows these shipyards to attract demand from other low-cost locations like India, Malaysia and Indonesia.

Global ship breaking or recycling market is approx. 25 to 35 Million DWT, quite small as compared to ship building or repair industry. In ship-recycling, India is one the market leaders with approx. 25% share[1] of the global market. However, there is rising potential competition from countries like Bangladesh and Pakistan on account of higher yield and limited regulatory compliances.

India requires a vibrant and robust shipbuilding and ship-repair industry for economic as well as strategic reasons. Under MIV 2030, key interventions have been identified across domestic ship building, repair and recycling areas as:

1. **Ship Building –** Channelizing domestic demand for Indian shipbuilding leveraging Atmanirbhar Bharat PPP provisions and minimizing ship-building cost by focusing on labor productivity, materials and financing costs
2. **Ship Repair –** Channelizing domestic demand for Indian repair leveraging Atmanirbhar Bharat PPP provisions, RoFR rules, and development of ship repair clusters
3. **Ship Recycling –** Enhance domestic ship recycling to promote 'Waste to wealth' through modification of BIS regulations and development of ship recycling infrastructure

5.2 Ship building

Ship building is a manufacturing industry endowed with the unique feature of having nearly 65 percent value addition[2] coming from other technology/ancillary industries such as steel, electronics, engineering, port infrastructure, etc. Being an order driven industry where each vessel is custom built, building an orderbook is essential for growth and sustenance of the shipbuilding industry.

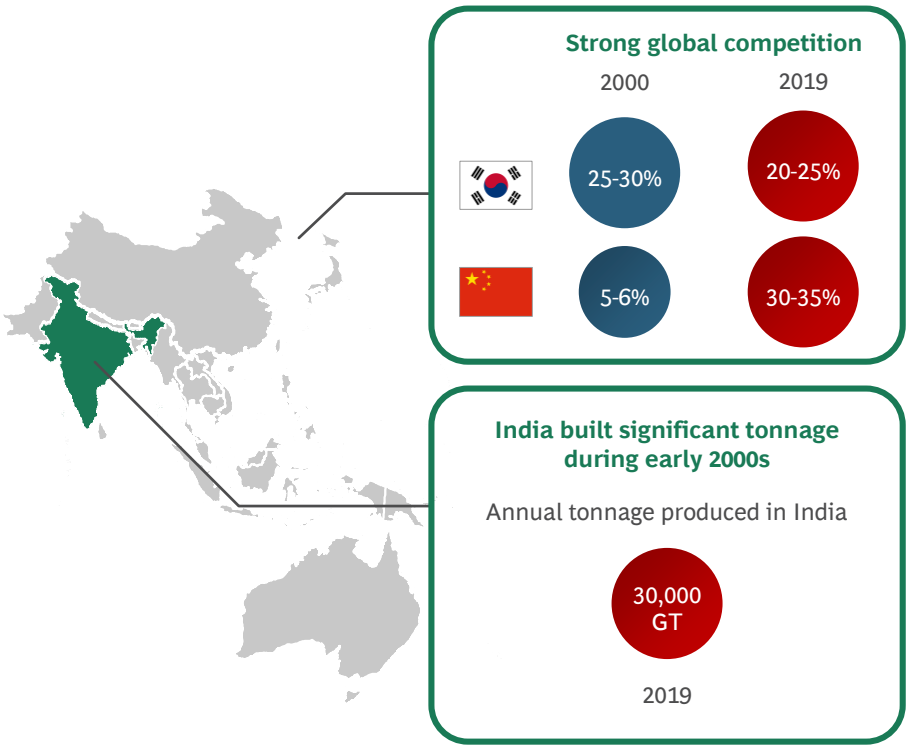
India has demonstrated strong shipbuilding capability in past with several shipyards delivering good quality vessels globally. However, Indian shipyards are struggling currently against global downturn and competition with protectionist measures (Exhibit 5.1). Central Govt. has initiated several policy measures for turnaround of the ship building industry such as:

1. Financial Assistance Policy on Shipbuilding (2016)
2. Grant of Infrastructure Status (2016)
3. Atmanirbhar Bharat Policy (Revised in 2020)
4. SOP for chartering/procurement of tugs (2020)
5. Pradhan Mantri Matsya Sampada Yojna (2020)

Being a core sector with one of the highest job multipliers, this has led to approx. 1.8 to 2 Lakh

1 Clarkson's Research, IHS Maritime, United Nations Conference on Trade and Development (https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=89492)
2 Ministry of Ports, Shipping and Waterways FY20 Annual Report

Exhibit 5.1 | Shipbuilding capability in India and globally



jobs (direct and indirect) generation in past few years. One of the primary issues in Indian shipbuilding currently is high cost disadvantage as compared globally (Exhibit 5.2). It is critical for India to gain around 25 to 30% cost competitiveness to win back tonnage by increasing automation levels and reducing material costs & financing costs.

Future of ship building is expected to be driven

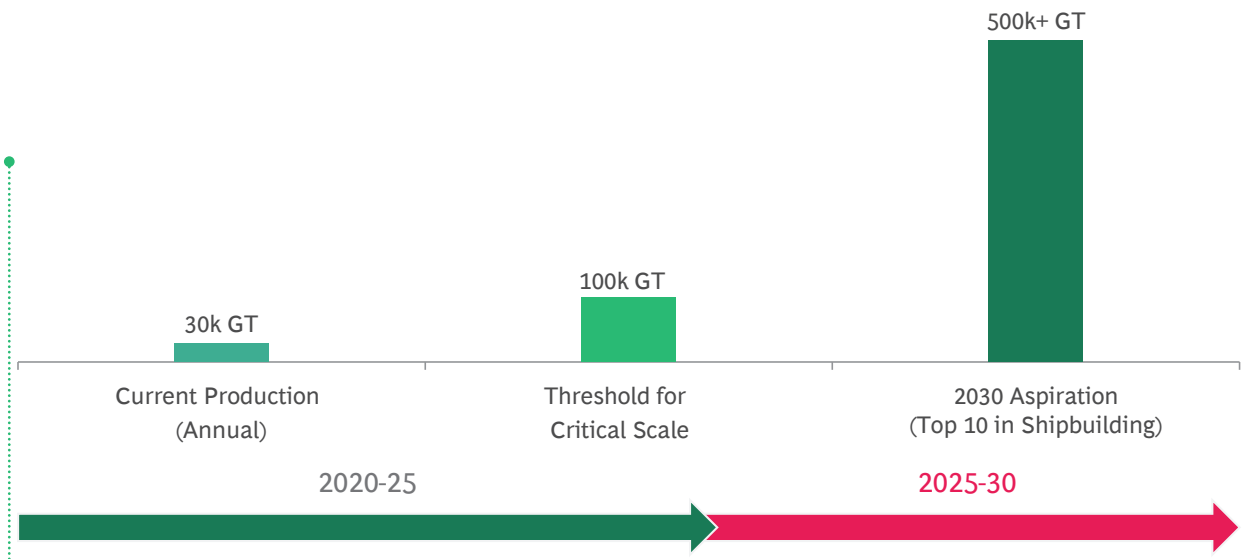
Exhibit 5.2 | Cost comparison of global ship building industries

	Material Costs (60-70% of vessel costs)			Labor Cost (30-40%)				Financing		
Country	Steel	Other Material	Relative Matl. Cost	Labor rate	Productivity	Net Labor Cost	Relative Labor Cost	Vessel cost (Relative)	Financing cost	Total cost of Ownership
	30-40% of material costs	60-70% of material costs		$/mhr	Mhr/CGT	$/CGT			Rate of interest (%)	
	100%	100%	100%	3-4	150-180	620	100%	100%	10-12%	100%
	90%	85%	87%	5-6	50-60	300	48%	75%	2-5%	74%
	95%	85%	89%	15-20	10-15	325	52%	78%	1-2%	78%
	95%	87%	90%	20-25	10-15	350	56%	80%	0-1%	79%

Note: Productivity analysis basis analysis for 9 major shipyards across China, Japan and South Korea, Other material costs basis relative costs for marine equipment and other overheads (power, etc.). India vessel cost does not include subsidy.
Source: International Journal of Business Performance Management, OECD, Industry Expert discussions

by green technology, autonomous vessels, and cost-efficient technologies. India has significant opportunity to build scale in short sea vessel segment. Vision 2030 envisions Indian ship building industry to rebuild the threshold scale by 2025 and initiate a 'Virtuous Cycle' to enable "Make in India, Make for World" (Exhibit 5.3).

Exhibit 5.3 | India's Ship building Vision 2030



Initiative 5.1: Channelize domestic demand for Indian Shipbuilding leveraging Atmanirbhar PPP provisions and RoFR rules efficiently

Most of the leading ship building nations have promoted domestic markets through regulatory interventions such as (Information box 5.1):

- Cabotage only for domestic flagged vessels
- Restrictions on imported ships
- Financing options for new ships
- Subsidies for scrapping old vessels

Also, several Asian countries have been protecting domestic markets from the influx of used imported vessels (Exhibit 5.4). Thrust area discussions have identified four key principles to ensure movement of domestic cargo under domestic flagged ships:

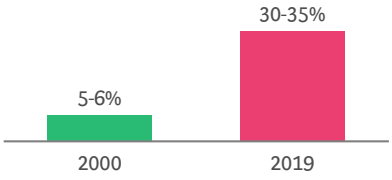
- End to end localization: Domestic cargo in domestic ships, built by domestic shipyards
- Gradual dis-incentivization of old and environmentally hazardous imported vessels
- Priority for domestic vessels while maintaining logistics cost efficiencies for the cargo owners
- Fiscal incentivization for ship building and repairs

Information box 5.1

Regulatory interventions across leading ship building nations:

China

% global SB market share



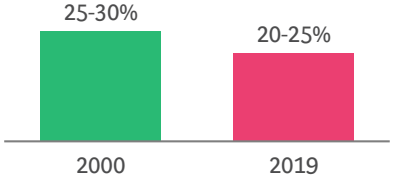
Cabotage only for Chinese flag, Chinese-built vessels
- Foreign flag, Chinese built vessels allowed in Shanghai Free Trade Zone

High tariff duties (9%), VAT (17%) for imported ships

Soft-loans, tax exemptions for local shipbuilders

South Korea

% global SB market share



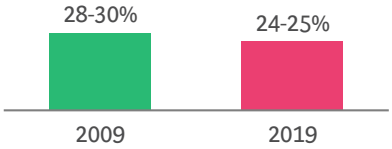
Cabotage only for South Korean flag vessels

Financial support to promote new ship demand - reimbursement up-to 60% of cost of new vessels (2018)

Easy financing options for ship-builders, bailout support

Japan

% global SB market share



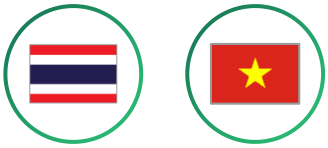
Cabotage only for Japanese flag vessels

Subsidy for scrapping old vessels given to owners/operators

Tax benefits to promote shipbuilding, fleet modernization - e.g. depreciation up to 60% in 5 years on Japanese owned ships

Source: UNCTAD, Press search, Expert inputs

Exhibit 5.4 | Age limits on imported vessels globally



Thailand Vietnam

15 years (imported)

Singapore

17 years (all vessels)

Malaysia

15 years (bulkers, tankers)

20 years (others)

Indonesia

25 years (imported)

Source: Publication by Association of South East Asian Nations, Govt websites

Five vessel segments (Exhibit 5.5) have been identified for domestic production at global standards, thus dis-incentivizing influx of used foreign tonnage. All Indian Public Sector Units (PSUs) will be required to provide long term charters (7 year+) for Made in India vessels suitably from 2021 onwards and provide long term visibility (6 to 9 months) for the cargo for all types of vessels.

Exhibit 5.5 | "Make in India" acceleration for Ship building industry

	< 10 years			Suggested Basic Customs Duties for Used Vessels		
	Type of vessel	GT	Timeline	< 10 years	10-25 years	25+ years
	Port Crafts, Tugs	All	2022	50%	100%	Not allowed
	Small dredgers	Up to 5K	2022	50%	100%	Not allowed
	Offshore vessel	All	2022	50%	100%	100%
	Coastal cargo	Up to 10K	2025	25%	50%	100%
	Inland cargo	Up to 2K	2025*	Not allowed		

Potential Cumulative Impact (2025): 500+ Vessels; 50,000+ Employment

Note: BCDs as per CBIC notification 50/2017 : 8904 = 5%, 8905 = 0%, 8901 = 0%. HSE = Health Safety and Environment

Also, Atmanirbhar Bharat policy measures have been laid out to incentivize domestic vessel hiring and chartering for port crafts, small dredgers, coastal and inland vessels.

1. Port crafts and small dredgers:

- PPP (Atmanirbhar) scheme to include PSU hiring / chartering services till 2023
  - Class I: Indian Flag, Indian built vessels
  - Class II: Indian Flag, Foreign Built Vessel
  - Non-local: Foreign Flag
- Post 2023, only Indian flagged vessels to be allowed to serve PSU / Govt. requirements
- Post 2025, Foreign built port crafts with 30+ years of age, not allowed for PSU / Govt. duty
- No foreign flag vessel with 20+ years age to be allowed for Govt. / PSU / Private use

2. Coastal and offshore vessels:

- PPP (Atmanirbhar) scheme to include PSU hiring / chartering services till 2023
  - Class I: Indian Flag, Indian built vessels
  - Class II: Indian Flag, Foreign Built Vessel
  - Non-local: Foreign Flag
- Post 2023, only Indian flagged vessels to be allowed to carry PSU / Govt. cargo/ offshore support
- PSU/ Govt. to provide 3 to 6 month rolling visibility of vessel requirements to ensure supply by the shipping lines
- No foreign flag vessel with 20+ years age to be allowed for Govt. / PSU / Private use

3. Inland Vessels:

- Only Indian flagged vessels allowed to transport PSU / Govt. cargo after 2023
- PPP (Atmanirbhar) scheme to include PSU hiring / chartering services till 2023
  - Class I: Indian Flag, Indian built vessels
  - Class II: Indian Flag, Foreign Built Vessel
  - Non-local: Foreign Flag
- No foreign flag vessel with 25+ years age to be allowed in cabotage for Govt. / PSU / Private cargo

Initiative 5.2: Develop common platform for ancillaries to showcase the products available for Indian shipbuilding

Globally, shipbuilding ancillaries have formed

associations and are part of a larger ecosystem (Exhibit 5.6). Similarly, Indian ancillaries across industries have formed associations to provide one-stop visibility into sectoral potential such as automobile, electrical equipment, lighting, etc. (Exhibit 5.7).

Ship building ancillaries in India could also form a virtual cluster to leverage the scale and create opportunities collaboration across ancillaries. For example, engineering goods sector presents a strong opportunity to be developed as a domestic ancillary ecosystem. Engineering goods is ex-

Exhibit 5.6 | Global shipbuilding ancillaries

Country	Ancillary Association	Shipbuilding: Global market share (2019)
South Korea	Korea Marine Equipment Association (KOMEA)	37%
China	Ancillaries are part of China Association Of National Shipbuilding Industry	33%
Japan	Japan Shipping and Marine Equipment Association (JSMEA)	13%

Source: Press search, Expert interviews

Exhibit 5.7 | Indian ancillaries across industries forming associations

Automobile

Automobile Component Manufacturer's Association of India

- **800+** manufacturers
- Represents **85%+** of auto component industry's turnover of **$57 Bn**

Electrical equipment

Indian Electrical & Electronics Manufacturers' Association

- **600+** manufacturers
- Combined turnover of **$42 Bn**
- Represents the **complete value chain** in generation, transmission & distribution equipment

Lighting

Electric Lamp and Component Manufacturers Association of India

- **60+** manufacturers
- Combined turnover of **$5 Bn**
- Association itself is part of Global Lighting Association (GLA)

Source: Secondary Analysis

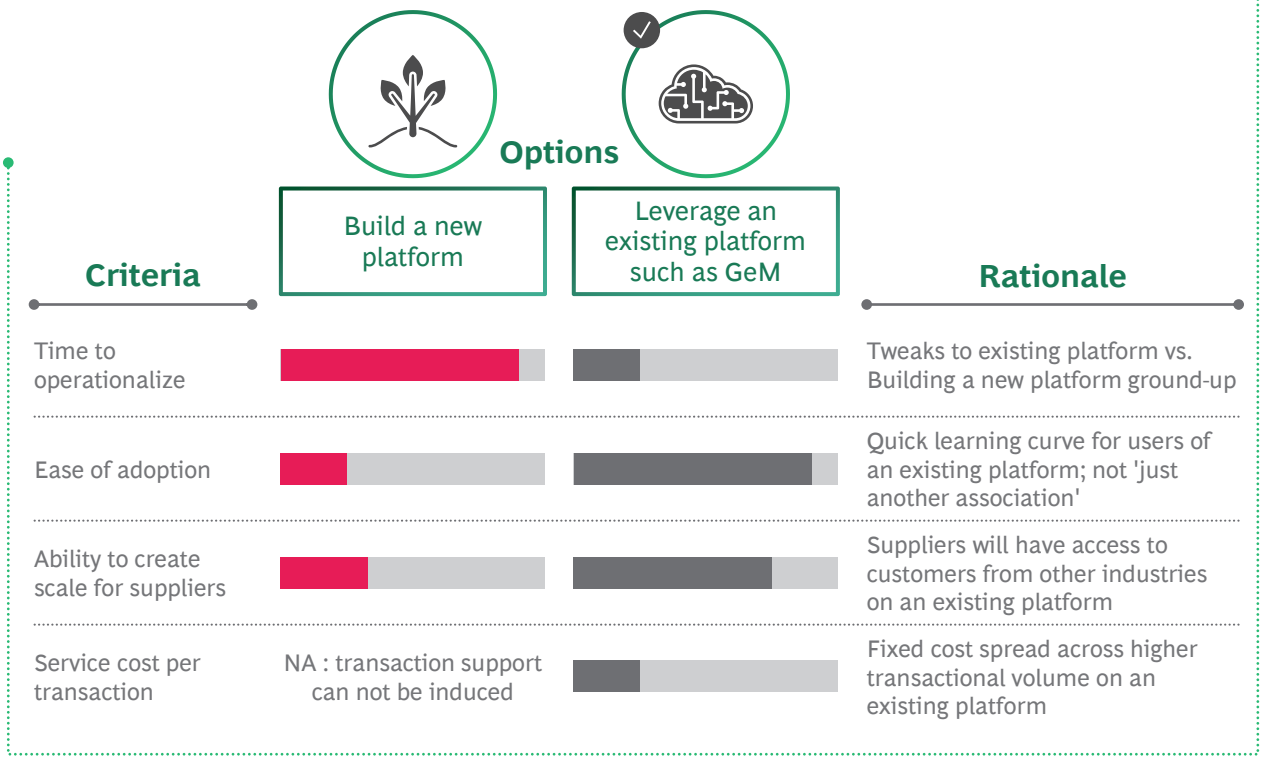
pected to be approx. USD 35 Billion market[3] in India by 2025 with castings, forgings, boilers and turbines as key sub-sectors.

Two options – building a new platform or leveraging an existing platform such as Government e-Marketplace (GeM) were analyzed (Exhibit 5.8) and it is recommended to leverage GeM platform for building the supplier market intelligence and development of virtual clusters. It is envisioned to onboard 500+ domestic and international marine equipment suppliers on GeM and achieve a target of 70%+ (by value) marine equipment procurement from indigenous sources by 2025.

Following action steps to be undertaken to build a database of shipbuilding ancillaries on GeM:

- Initiate mandatory e-procurement for PSUs in low value categories and gradually expand to all
- Modify new supplier onboarding process to ensure all new engineering suppliers indicate if they can cater to ship building industry

Exhibit 5.8 | Comparison of two options to create the virtual clusters



- Enable a sub-portal for international suppliers to onboard and bid in collaboration with domestic suppliers
- To drive scale for suppliers, encourage private organizations to procure specific categories from GeM

Initiative 5.3: Create a common database of standard-vessel basic designs with pre-approval from Indian Register of Shipping (IRS) to drive standardization, improve design process and leverage cost economies

Significant delays in vessel delivery have been observed in past few years across Indian shipyards. Key challenges are as follows:

- Most of the basic designs and detailed engineering designs are prepared and classified from scratch for every vessel manufactured (clean sheet designs)
- Limited indigenous capability exists in basic design (around 30-40% indigenization only)

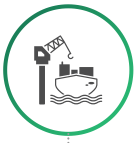
Several countries have effectively utilized standardization of designs and parts to bring efficiencies in their ship building industry (Information box 5.2). Availability of pre-approved standardized marine designs can improve shipyard's productivity by 2 to 3 weeks and reduce cost of production through economies of scale.

MoPSW to undertake following step for development of database with pre-approved standardized basic designs for domestic shipyards:

1. Selection of vessel designs to be standardized and create designs database
2. Collaboration with foreign shipyards and design houses to develop basic and functional design for each vessel type

Information box 5.2

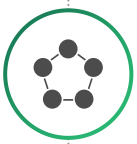
Indonesia | Standardization of designs and parts in ship building industry



Indonesian shipyards took lead in the drive towards standardization

Govt. intervened by assigning specific shipyards to design and produce particular type of vessel

A national standards body was established to supervise process and coordinate, maintain relations with foreign national standards bodies



Design and component standardization helped Indonesia minimize range of equipment, parts, interfaces & documentation

3. Approval provided by IRS basis existing norms and standards
4. Creation of digital models for designs and databank for all pre-approved vessel designs
5. Usage of pre-approved designs for customization of registered/ member yards

Thrust area discussions have resulted in following implementation guidelines:

1. IRS is proposed to undertake the responsibility of design standardization

- Dedicated IRS consulting wing to conduct study and coordinate across stakeholders Two potential sources of funding for R&D identified: Ministry's R&D fund and proposed Maritime Development Fund (covered in section 4.5)

2. Type of vessels: Port crafts, small dredgers, coastal and offshore vessels, and inland vessels
3. IRS to control Intellectual Property (IP) rights

Initiative 5.4: Develop strong marine design ecosystem by identifying design clusters and incentivizing for 'Design in India'

Presently, global firms cater to most of the complex design requirements in India while local firms cater primarily to basic design requirements (Exhibit 5.9). India's local ship design services industry is highly fragmented with 20+ small firms in operations today. Local players constitute around 40 to 50% of the ship design market, indicating India's overreliance on global firms for design expertise. It is critical to develop a local ecosystem through specific "Ship building design clusters" for ship design solutions and vessel related R&D (Exhibit 5.10).

Existing Information Technology-Enabled Services (ITES) industry and presence of strong maritime talent pool can be leveraged to accelerate development of ship building design clusters in India. Mumbai, Chennai and Cochin regions emerge as potential locations with strong IT ecosystem and around 40 Marine Training Institutes (MTIs) (Exhibit 5.11).

Exhibit 5.9 | Comparison of two options to create the virtual clusters

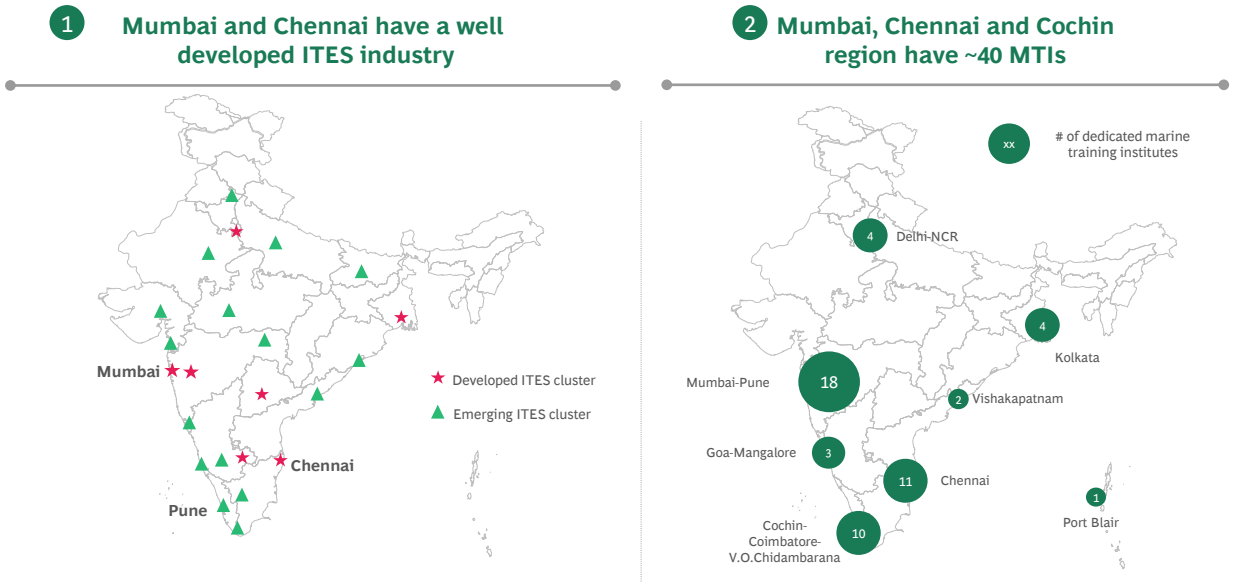
		Vessel Type	1 Basic design	2 Production design
Large vessels	Complex design	1. Container ships 2. Oil tankers 3. LNG /LPG carriers 4. Product/ chemical carriers 5. Cruise liners 6. Bulk carriers	Largely global play with **< 5%** local share	Largely global play with **< 10%** local share
Large vessels	Simple			
Medium and small vessels	Complex design	7. Passenger vessels incl. inter island 8. Ro-Ro/ reefer 9. Specialized vessels (e.g. Well stimulation, diving support etc) 10. Coast guard boats 11. OSV/PSVs 12. AHTS 13. Dredgers (complex)	Significant global play with **< 30%** local share Segment size (FY15) **INR 50–60 Cr**	Largely local play with **> 80%** market share Segment size (FY15) **INR 25–30 Cr**
Medium and small vessels	Simple design	14. Dredgers (simple) 15. General cargo 16. Mini Bulkers/tankers inc. feeder v/ls 17. Tugs 18. Barges 19. Small carriers (dry cargo, product etc) 20. Small passenger boats including pilot boats 21. Survey vessels 22. Marine police / BSF vessels	Significant local play with **> 95%** local share Segment size (FY15) **INR 25–30 Cr**	**100%** local play with significant share of shipyards

Exhibit 5.10 | Key elements of ship design and vessel R&D segments

	1 Basic Design	2 Production Design
Design	• Hull design - Definition of hull shape, compartment configuration, preliminary body plan • Structural analysis - Model testing, detailed structural analysis and scantling computation - Hydrostatic and stability requirement determination, detailed weight calculation • Equipment and cost - Equipment selection - Overall vessel cost calculation - Validation against concept design	• 3D modelling - Hydrodynamic / hull modeling, structural outfitting, propulsion modeling - Specialized systems; Eg: LNG containment system • Machinery and equipment layouts - Machinery and foundation layouts - Ballast systems and tanks - Ship access, HVAC modeling • Piping and electrical layouts - Piping modeling, electrical cable layout - Accommodation modeling • Extracting drawing from 3D to 2D
	1 Hydrodynamics	**2 Operations**
R&D	• R&D related to hull form and stability; Eg: - Enhancing reliability, service life and energy efficiency of hull • Development of simulation models / software; Eg: - Development of CFD tools for computing flow around vessels	• Enhancement of vessel performance and efficiency; Eg: - Acoustic/ vibration control technologies - Technology to reduce emission footprint • Development of niche technology; Eg: - High-end technology solutions for operations in extreme climate conditions

Note: All other technical activities related to shipbuilding not a current priority; activities include technical consultancy / R&D related to construction and performance improvement of shipyards

Exhibit 5.11 |Mumbai, Chennai and Cochin as potential ship design cluster locations



Source: Press search, Expert interviews

Other key considerations for 'Ship building design clusters' are as follows:

- Specific tax breaks required for the design firms on the lines of IT SEZs
- Incentives for the design firms based on:
  - ¬ Employment generated
  - ¬ Percentage of annual man hours deployed for shipbuilding industry
  - ¬ Revenue earned from shipyards and ship design activities
- Income tax subsidies for the personnel employed in design firms

5.3 Ship Repair

Global ship repair market is currently dominated by shipyards in China, Singapore, Bahrain, Dubai and Middle East largely due to the availability of a skilled workforce and latest technology. The global market for ship repair and maintenance service is expected to witness significant growth, reaching a market value of USD 40 Billion by 2030[3] supported by developments in the markets in South East Asia and India.

Though India's share in global ship repair is less than 1%, the country's location is favorable with 7 to 9% of the global trade passing within 300 NM of the coastline[3]. Additionally, India is poised well to offer repair services to Indian Navy and the allies US Navy's 5th and 7th fleet in Indian Ocean & Arabian Sea (Exhibit 5.12).

The untapped potential in the Indian ship repair market can be attributed to the presence of competing international ship repair yards on major trade routes and a capability gap of Indian yards in repairing certain kinds of vessels. Other reasons of cost disadvantages include high cost of financing, lack of supply of ship spares in India and technology related issues increasing ship repair execution cycle time.

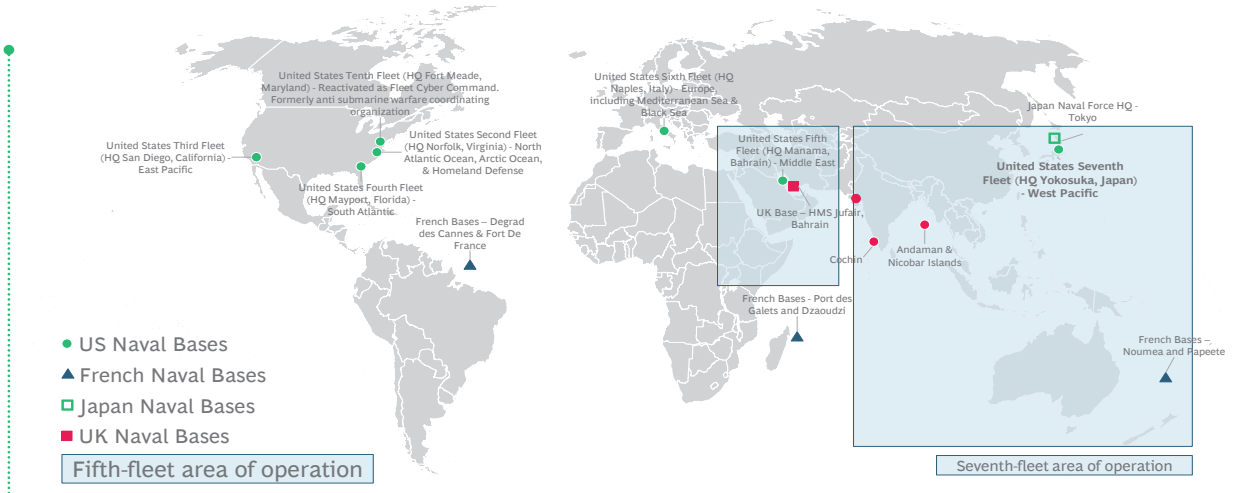
Initiative 5.5: Channelize domestic demand for Indian Ship repairing leveraging Atmanirbhar Bharat PPP provisions and RoFR rules efficiently

In short-term, four key interventions have been identified to promote domestic ship repair facilities with additional INR 4,000 to 5,000 Cr. market potential[4] and 30,000 to 35,000 addition annual employment potential[4]:

Planned repairs of vessels for all contracts under INR 200 Cr. value to be carried out through local shipyards under 'Atmanirbhar Bharat' provisions

- All PSUs and GOI entities shall repair the vessels under their control (owned and operated) in Indian yards only in pursuant with the DPIIT – PPP Aatmanirbhar provisions[5]
- In case of bundling of ship repair services either by job-work or vessels or any other means, the individual values of services shall fulfill the less than INR 200 Cr criteria.
- PSUs shall plan and publish all vessel repair/ upgrade/ conversion requirements, for next 4 quarters to enable capacity planning by the domestic yards
- Exceptions:
  - Requirement of emergency repair for vessel in International waters
  - Non-availability of domestic shipyard capacity despite the 4-quarter visibility

Exhibit 5.12 | Strategic opportunity to offer ship repair services to Indian Navy and allies



3 Ministry of Ports, Shipping and Waterways FY20 Annual Report

4 Employment potential computed basis annual direct employment of 400 people for 100 Cr. worth of repair and 5-7X in-direct employment multiplier

4. For all contracts with value >200 Cr. – Existing RoFR rules (and 2016) should be strictly adhered to, in true letter and spirit

- Provide Right of First Refusal (RoFR) to Indian shipyards for all vessel repair/ upgrade/ conversion in pursuant with amended RoFR rules of 2016. This shall be applicable for all vessels including rigs and specialized vessels, offshore marine units etc.
- PSUs and Governments make intervention to ensure adherence to the principles of Aatmanirbhar Bharat in letter and spirit

5. Entities under administrative control of MoPSW to ensure all vessels owned and operated shall only be undertaking their planned repairs in Indian shipyards

- All PSUs and Governments under administrative control of MoPSW (including Shipping Corporation of India, Dredgers Corporation of India, Major Ports etc.) shall repair the vessels under their control (owned and operated) in Indian yards only
- PSUs shall plan and publish all vessel repair/ upgrade/ conversion requirements, for next 4 quarters to enable capacity planning by the domestic yard
- Exceptions:
  - ¬ In case of prevailing contract necessitating requirement of repairing in foreign yards, unless an extension is being provided
  - ¬ Requirement of emergency repair for vessel in International waters
  - ¬ Non-availability of domestic shipyard capacity despite the 4-quarter visibility

6. Proposed fiscal interventions:

- GST for ship repair and its inputs to be brought to 5%, i.e., in line with Civil Aviation repair
- Uniform GST of 5% for all inputs
- 0% GST for foreign vessels conducting vessel repairs in India
- Ship Repair Units (SRU) and OEMs to be permitted Free Trade Depots (FTD) for easy import and export for spares, on the lines of FTWZ – however without restrictive conditions on minimum area and investment requirements

In long-term, following two interventions to be undertaken for promoting domestic ship repair facilities:

1. Vessels availing cargo ROFR through PSUs and Government entities shall be mandatorily be repaired in Indian shipyards only

- All the agencies/ship owners who are availing benefit of ROFR for reservation of cargo should necessarily carry out repairs of such vessels operated in Indian yards
- GOI/ PSU who are calling for such charter for movement of Cargo shall ensure repair of vessels are carried out in Indian yards.
- Exceptions:
  - ¬ Requirement of emergency repair for vessel in International waters
  - ¬ Non-availability of domestic shipyard capacity despite the 4-quarter visibility

2. Vessels being engaged for long term time-chartering contracts by PSUs and Government entities, should undertake planned repairs in Indian shipyards only

- All PSUs and Governments shall ensure the repairs of vessel engaged by them under long-term time voyage contracts are repaired in Indian yards only by mandating the shipowners/ shipping agencies operating the vessels *(irrespective of the value of contract)*
- Vessel repair/upgrade/conversion requirements can be declared for next 4 quarters to enable capacity planning by the domestic yards
- Exceptions:
  - ¬ Requirement of emergency repair for vessel in International waters
  - ¬ Non-availability of domestic shipyard capacity despite the 4-quarter visibility

Initiative 5.6: Enhance ship repair yard capacity through ship repair clusters, easy norms of Free Trade Depots, and development of floating drydocks

Currently, repair cost in India on an average is 1.4 times[6] the average cost of repairs in Dubai or South East Asian countries, primarily due to higher procurement costs and limited efficiency in working processes. Also, Turnaround time (TRT) for repairs in Indian yards on an average is 1.4 - 1.6 times[6] global repair yards on account of following points:

- Long drawn out procedures for procurement and custom clearances
- Shortage of specialized lifting /material handling equipment and shore cranes

5 DPIIT-PPP Aatmanirbhar Bharath is applicable to all vessels repaired/ upgraded etc. irrespective the vessels are being used for Governmental use/for the own purpose or for the purpose for doing business (chartering/leasing etc) by all GOI entities and PSU

6 Expert discussions

- Non-standard operations & minimal training manpower
- Longer lead times because of operational policies of public undertaking structure

4 action items to be undertaken to enhance ship repair capability in India:

1. Set up infrastructure and declare two ship repair clusters under following recommendations:

Infrastructure recommendations	Key characteristics of recommendations for enhancing ship repair yard capacity
1 Ship docking facilities	• Small dry docks to dock ships within IV limits, medium dry docks to target vessels between 6000 to 10000 DWT and larger dry docks to target vessels larger than 10000 DWT • Minimum draft near the docks to be maintained as per the requirements of vessels coming for repair
2 Ancillary parks	• Ancillary industries should be established in and around the ship repair clusters • Key global and local suppliers to manufacture and stock their products
3 OEM service centers	• OEMs should be incentivized to service centers to support equipment repair for vessels and logistical requirements for moving parts & people in and around the cluster area
4 Housing for workers	• Good housing facilities along with ample electricity & water facilities to ensure workers don't have to travel long distances every day thereby ensuring higher availability in the yard
5 Floating dry docks	• Authorize global ship repair agencies to build floating dry docks to supply repair services during peak times of the year at lower cost of operations
6 Warehouses for value-add services	• Build warehouses with storage capabilities to stock inventory for at least 3 months, live tracking of parts & equipment and semi-automated / automated part handling capabilities
7 Logistics infrastructure	• Setup road, rail and water logistics to enable faster and low-cost transportation of goods and people • Live tracking of shipments using GPS technologies allowing the teams to constantly monitor

Cluster Management Committee (CMC) recommendations	Key characteristics of recommendations for enhancing ship repair yard capacity
1 Coordinate and promote the local industrial hubs and MSMEs	• Collaborate with local suppliers & MSMEs to source nonstandard spares & materials required • Identify established suppliers capable to build import quality spares to help repair yards reduce cost & TAT of repair jobs
2 Promote participation of ancillary industries	• Reach out to other Industry & Defense supply hubs for sourcing of spares & equipment to further the cause for Make in India Program
3 Coordinate with recycling yards	• Constantly monitor the spares consumption in the recycle yards and evaluate if the materials can be reused for repairs, subject to rules & regulations
Fiscal & Regulatory recommendations	
1 Free Trade Zones	• Declare the clusters or part of them as Free Trade Zones to help reduce import and operations cost thereby improving competitiveness in the international market • Reduce GST levied on spares & machinery required for repairs
2 Incentivize key global OEMs to stock spares	• Provide slab-based exemption to OEMs from customs for stocking spares in India • Dedicated warehouses in FTZs to manage inventory for such OEMs
3 Temporary immigration work permits for foreign experts	• Issue temporary work permits for small period to suppliers of some of the top global well-known OEMs. This will reduce the time taken by them to reach the yard to support in ship system specific repairs

2. Establishing small repair facilities for Fishing & Inland vessels as follows:

Levers	Suggestions
Locations	• Two facilities to be set up in each state near fishing harbours • One facility to be setup in each NW (1 to 5) near Industry concentrations
Additional infrastructure	• Warehousing facilities to meet needs of these repair facilities • Creation of a common portal where repair yards and major clusters are listed and can be contacted
Support	• Technical help from nearest ship repair hub and cluster • The nearest ports in the region to support these facilities
Funding	• Shared funding model amongst GOI, state govt. and ship owners based on ownership model of repair hubs
Training and skill Development	• Workforce to follow best practices and meet necessary standards • Based on demand, training of workforce for advanced repairs of vessels can be done at CoETC

3. Developing Cruise repair hubs as follows:

Levers	Suggestions
Infrastructure Development	• Upgrade the current facilities at Mumbai, Goa, Cochin and Chennai • Necessary port infrastructure required under the Government of India initiatives
Tie ups	• Joint ventures with leading cruise ship building and repair nations with Indian yards to develop cruise ship repair in India
Additional support	• Identify technology partners • Identify OEMS for supporting cruise ship repairs

4. Developing easy norms of Free Trade Depots, on the lines of FTWZ, as below:

- Minimum size of Free Trade Depot to be 5 Acres, if housed under ship repair cluster or in 10 km proximity to major shipyard
- Employment generation to be a criterion under investment conditions. Exact number of jobs can be further identified through a DPR
- No Net Foreign Exchange Earning (NFE) condition to be imposed

Key guidelines to initiate setup of Ship Repair clusters are as below:

- Select one of the 3 locations (Maharashtra, Goa and Cochin regions) where shipyard has capability to repair medium to large vessels, minimum concentration of suppliers nearby and empty land space available to build a cluster
- Shortlist the types of repairs based on docking infrastructure and repair facilities available

- Define fiscal incentives to engage OEMs to setup service centers and warehouses to stock spares
- Identify investments required in the logistics infrastructure to further ease the movement of goods and people

Initiative 5.7: Develop Centers of Excellence (CoE) for Ship repair in India

As highlighted in Exhibit 5.13, 6 potential locations have been identified to setup ship repair CoE. Ship repair CoE to focus on following 3 key areas:

1. Thought leadership: Set vision to drive technological upgradations of dock infrastructure and repair capabilities
2. Capability build: Training & development of workers & officers through creation of functional & vessel specific training programs
3. Ancillary development: Support development of ancillary ecosystem to reduce import content and enable faster movement of material

Ship repair CoE can be housed within existing institutes such as CEMS (Exhibit 5.14) with following operating guidelines:

- Ship Repair Division to be responsible for its own P&L in the organization
- Independent professionals to head subdivisions
- All subdivisions to define revenue model based on:
  - Research
  - Consulting
  - Certifications
  - Training

CoE to work closely to develop a strong and sustainable ancillary industry for ship repair:

- Ancillary clusters need to be setup in and around key yard clusters to attract key global and local suppliers to manufacture and stock their products
- Clusters with policies on in line with economic zones/ SEZs etc. to attract investors required - Preferred funding and tax holidays
- Use of ship operations and past repair data and predictive maintenance schedules to create spares requirement from ancillary industries
- Restriction of foreign import of parts and ships will incentivise shipyards to approach indigenous ancillary industries

Exhibit 5.13 | Potential locations for Ship Repair CoE

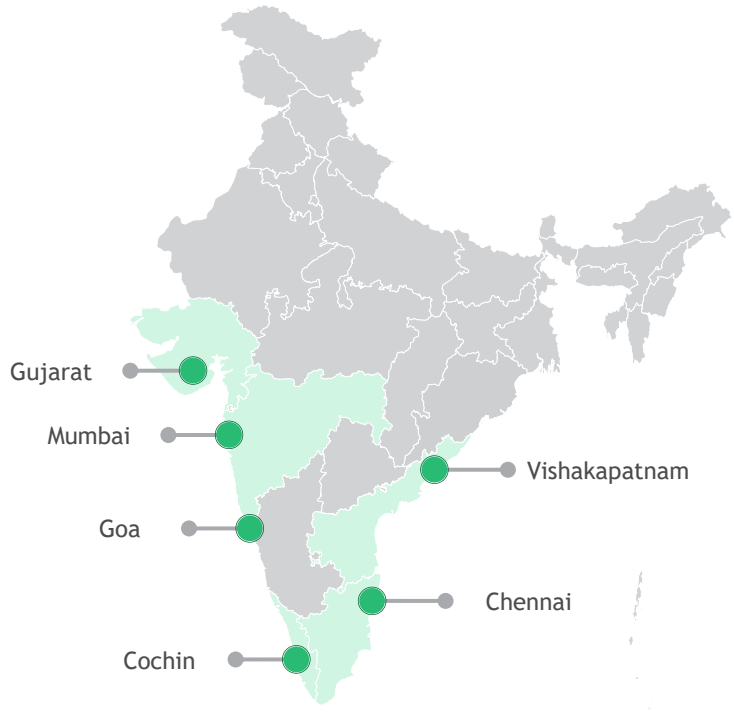
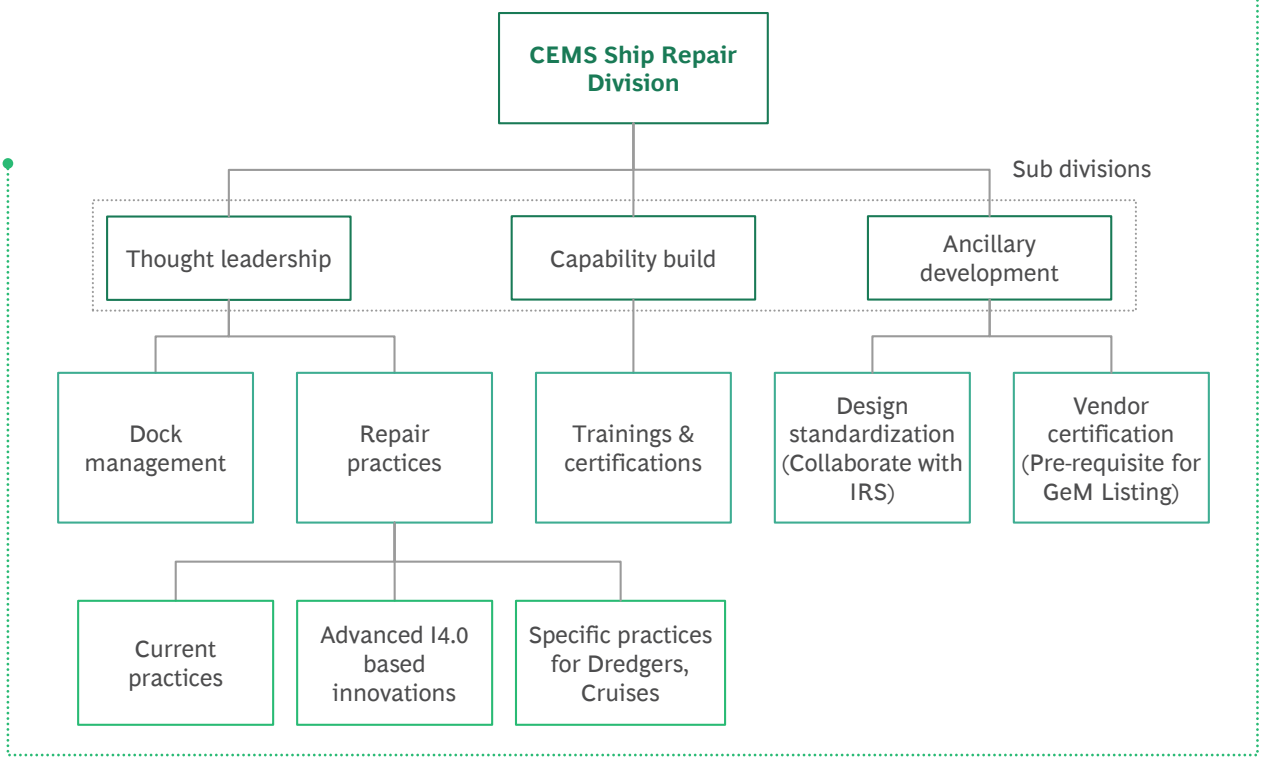


Exhibit 5.14 | Ship Repair CoE operating model



5.4 Ship Recycling

As of 2020, Ship breaking in India takes place mainly at Alang-Sosiya in Gujarat, with limited capacities available at Kolkata, Kerala, and Mumbai as well.

While India's market share in ship recycling market has dropped since 2016[7], Bangladesh market share has more than doubled on account of limited regulations and higher requirement of steel scrap driving higher price realizations for ship owners (30-40% in Bangladesh vs 1-2% in India)[7]. 3 key interventions have been identified to drive demand in ship recycling industry:

- Relaxation in BIS (steel scrap standards) to enhance yield per ton of scrap and exempt ship scrap use in re-rollable bar manufacturing basis strength and quality in place of metallurgical history
- Redevelopment of plots at Alang and creation of a ship repair cluster on the east coast to capture market share
- Setup of a facilitation centre to promote Indian ship recycling industry through hosting trade fairs and exhibitions

Initiative 5.8: Modification of BIS regulations (IS 1786:2008) governing TMT bar production to allow usage of ship scrap basis material composition and strength/ quality

Current BIS regulations limit usage of recycled steel scrap in manufacturing re-rollable bars driving lower prices in India. Share of recycled ship steel scrap usage (%) for re-rollable steel has dropped from 70-80% to 40-50% post imposition of Quality Control Order (QCO)[8].

Modification of BIS regulations on requirement of metallurgical history of steel scrap from ship recycling to be proposed to Ministry of Steel basis as follows:

- Exemption to steel scrap from ship vessels for use in re-rollable bar manufacturing
- Use of quality and strength tests in lieu of metallurgical history for determining use

Initiative 5.9: Enhance Ship recycling infrastructure through redevelopment of Alang plots and establishment of additional recycling cluster on East Coast

7 United Nations Conference on Trade and Development (UNCTAD)
8 Expert discussions

Along with restart of operations at Sachana, it is recommended to focus on redevelopment of plots at Alang through infrastructure development and compliance with environmental challenges as below:

Lever	Key initiatives
Infrastructure Development	• Development of Ship Recycling Park at the back of ship recycling yard at Alang and explore possibilities to develop along other coastal areas
	• Treat Alang as 14 km stretch major port and ensure 2 km from seashore under Port area, sealed with walls and gates. All re-rolling and melting mills housed inside this port, with only end products like steel bars and ingots, furniture and wastes outside the gates.
	• Merge small yards to make big yards (each with 120+ meter width) and length of plot to be about 200m
	• Development and establishment of ISO17025 accredited lab testing of hazardous waste.
Compliance with environmental challenges	• Converting all yards into dry dock to prevent attacks from international NGOs.
	• Ensure adoption of a zero residue model of ship recycling at all plots
	• Underground waste water/oily water collection from all yards to waste treatment plant ensuring zero leakage of liquid waste to sea

In addition to this, an additional ship recycling cluster to be established on the East coast with following benefits:

1. Capture Market share from Bangladesh
   - ¬ Limited facilities in the East, leads to increased tonnage for Bangladesh
   - ¬ With price realization equal across 2 countries, ship owning countries on East (Korea, Japan etc.) prefer Bangladesh over India
2. Smaller vessels and fishing ships
   - ¬ Great potential to capture the domestic market of smaller vessels and fishing ships on the east coast
3. potential locations have been identified to develop ship recycling cluster on the East coast as below:
   - ¬ Odisha
   - ¬ Andhra Pradesh
   - ¬ West Bengal

Initiative 5.10: Setup ship recycling facilitation centre to promote ship recycling activities and enhance marketability of ship by-products through trade fairs at ship breaking yards involving stakeholders across shipowners to downstream industries

Following action steps to be undertaken:

- Establish Ship recycling facilitation centre
- Conduct first 2-day fair with both Indian and International stakeholders at Alang
- Establish mechanism to host bi-annual fairs for trade promotions

5.5 Conclusion and Summary

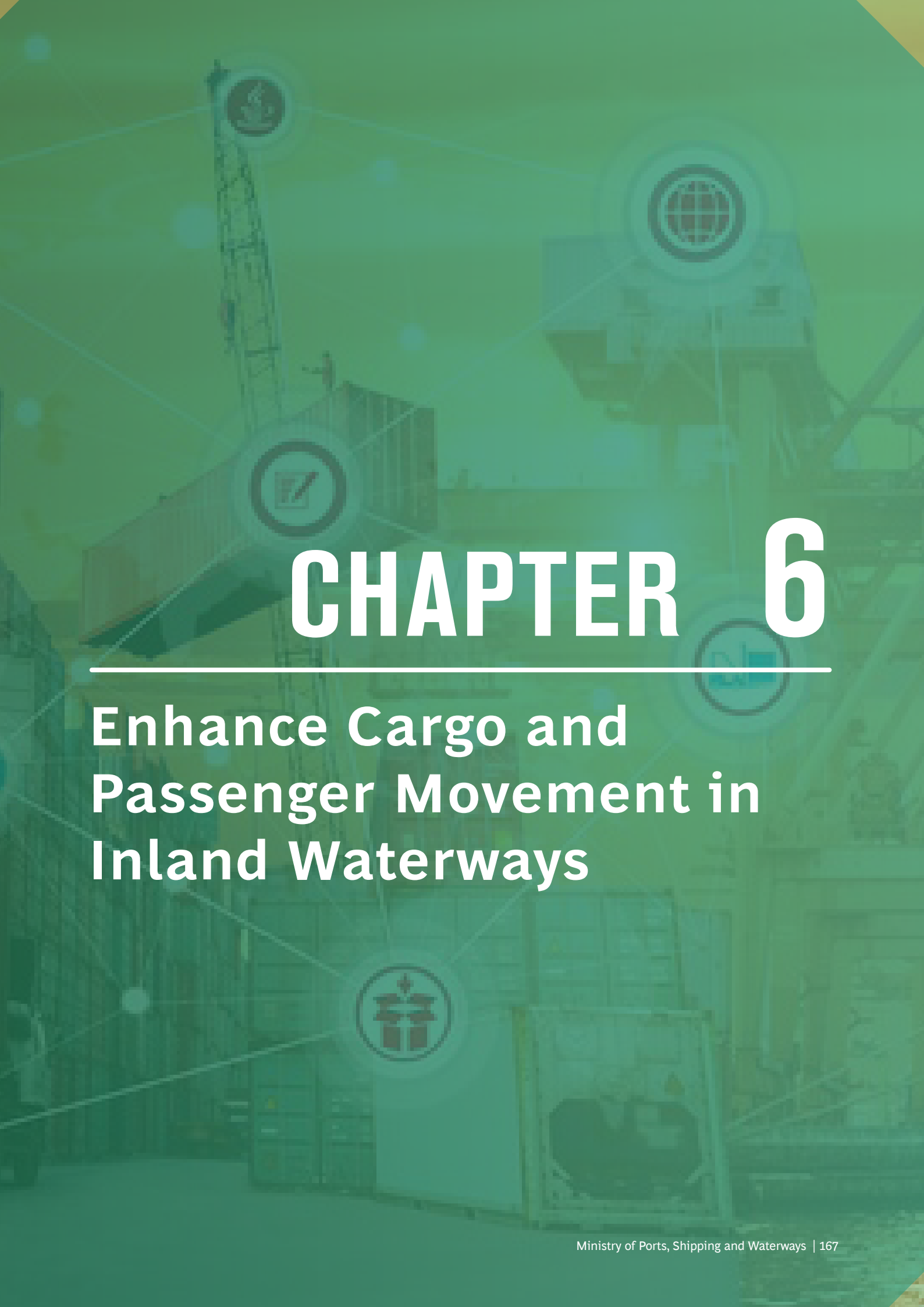
As part of Vision 2030, key targets have been defined to promote domestic ship building, repair and recycling (Exhibit 5.15). India needs to channelize domestic demand for ship building and ship repair leveraging Atmanirbhar PPP provisions and RoFR rules effectively. Also, ship repair clusters to be developed for enhancing repair capacity in India. India's ship recycling sector to be promoted through modification of BIS regulations, re-development of ship recycling infrastructure at Alang, and creation of a ship recycling cluster on the East Coast.

Exhibit 5.15 | KPI targets and impact

Category	KPI metric	Current	Target (2030)
Ship building	Gross tonnage of ships built in India	27,000 GT	5,00,000 GT
	World ranking in ship building	>20	Top 10
Ship repair	World ranking in ship repair	>20	Top 10
Ship recycling	World Ranking in Ship recycling	2	1

INR 20,000 Cr.+
(Investment)

1,00,000 +
(Additional jobs)



CHAPTER 6

Enhance Cargo and Passenger Movement in Inland Waterways

Enhance Cargo and Passenger Movement in Inland Waterways

6.1 Current landscape

India is endowed with various Inland Water Transport (IWT) options that comprise rivers, canals, backwaters, creeks, and tidal inlets. These not only form a competitive alternative mode of transportation with lower operating cost (30% lower than the railways and 60% lower than road[1]) but also an environmentally friendly and sustainable mode in freight logistics and passenger transport.

To harness the potential of IWT, Inland Waterways Authority of India (IWAI) was established in 1986, and since has been working towards development and regulation of inland waterways. From only five waterways recognized as National Waterways (NWs), the Government of India notified 106 additional waterways as National Waterways in 2016. In addition to notification of NWs, the government has also undertaken initiatives for speeding infrastructure development too. These include Jal Vikas Marg for NW 1, Arth Ganga and Arth Brahmaputra for holistic and sustainable development leveraging NW 1 and NW 2 for freight and passenger movement, Inland Vessels Bill, Land Use Policy for IWs, Dredging Policy for IWs, and promoting private participation in terminal operations and maintenance. As a result, the total cargo volume transported through inland waterways in India reached 73.6 MTPA in 2019-20 and has grown at a CAGR of 19% over last five years[2].

Despite the strong growth witnessed in the past years, the potential of IWT remains unexploited. Modal share of IWT in freight movement is 2% leaving significant room for growth. Key impediments in development of this sector include – limited infrastructure availability, shortage of inland vessels and non-availability of return cargo. Further governance issues due to overlapping jurisdictions also slow down the sector progress.

Once seamlessly integrated with other means of transport, specifically merging with the coastal, IWT can provide significant relief to congestion on the road and rail infrastructure. It can act not only as a supplementing means of transportation, but has significant potential in river and canal tourism which is yet to be tapped to its potential.

In order to address the above issues and accelerate cargo and passenger movement through IWs four focus areas have been identified:

1. Enhancement and development of infrastructure at 23 priority NWs
2. Regional Connectivity with Bangladesh, Nepal, Myanmar and Bhutan
3. Development of terminal infrastructure for Ro-Ro and Ferry Services
4. Policy interventions to incentivise development of the IW sector

6.2 Infrastructure development for 23 priority NWs

Development of necessary infrastructure to enable movement of cargo and passengers on the inland waterways is one of the most important aspect for promotion of the sector. At present, approximately 74 million tons per annum (MTPA) cargo is transported annually through 16 functional NWs (Exhibit 6.1).

Priority development of NW 1 has been undertaken through Jal Vikas Marg Project (JVMP), which includes Arth Ganga as an integral part. While Arth Ganga focusses on generating sustainable income streams, Jal Marg Vikas project is aimed to develop river Ganges as a commercially sustainable and safe mode of navigation. The economic and social parameters of JMVP and Arth Ganga have been analyzed that indicate an economic boost of approx. Rs 1,000 crores over the next 5 years[3]. Apart from providing benefits in terms of trade, local community's enhancement and passenger facilitation, Arth Ganga project will also ensure large scale skills enhancement and public/private sector capability developments. The new developments under Arth Ganga will ensure wide state and private sector participation in the IWT sector in various areas including development, operations, maintenance and management.

As a target for the next 10 years, government has prioritized development of 23 NWs which have significant traffic potential (Exhibit 6.2).

1 Inland Waterways Authority of India
2 Secondary research ; TA Discussion
3 Inland Waterways Authority of India

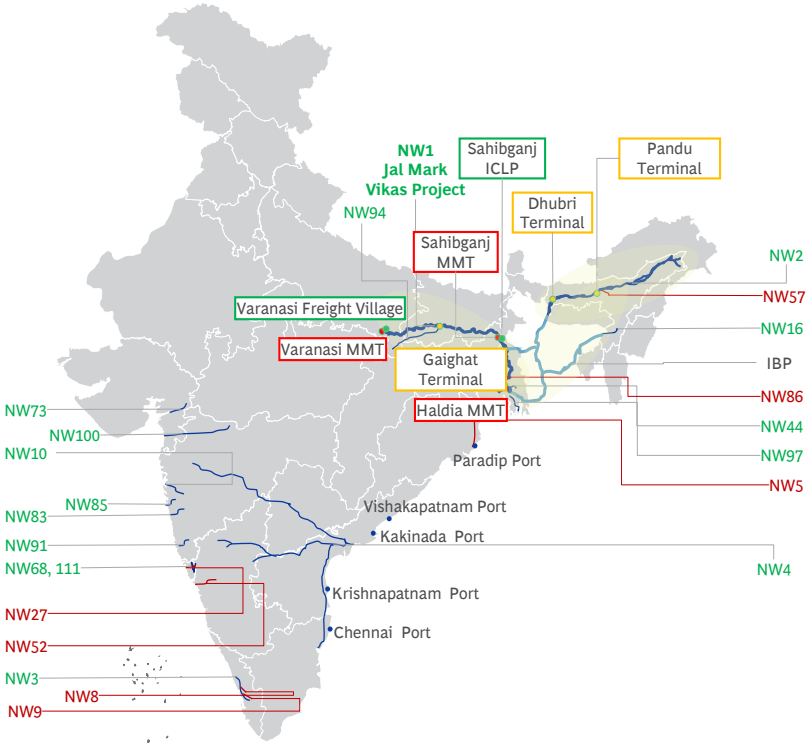
Exhibit 6.1 Operational Waterways in India

S.No	National Waterway	Name of river system	State	Cargo in MTPA FY 19	FY 20	FY 21 (P)
1	NW 100	Tapi river	Maharashtra and Gujarat	28.8	30.9	30.5
2	NW 10	Amba river	Maharashtra	22.4	22.0	22.0
3	NW 1	Ganga-Bhagirathi-Hooghly River (Haldia-Allahabad)	UP, Bihar, Jharkhand and West Bengal	6.8	9.1	11.0
4	NW 97	Sundarbans waterway	West Bengal	3.2	3.5	3.5
5	NW 68	Mandovi river	Goa	1.7	1.6	1.6
6	NW 85	Revadanda Creek-Kundalika River System	Maharashtra	1.8	1.6	1.6
7	NW 111	Zuari river	Goa	2.1	1.4	1.1
8	NW 44	Ichmati river	West Bengal	0.0	0.9	0.9
9	NW 94	Sone river	Bihar	0.0	0.8	0.8
10	NW 3	West Coast Canal, Champakara and Udyogmandal Canals	Kerala	0.4	0.5	0.6
11	NW 83	Rajpuri river	Maharashtra	0.8	0.7	0.6
12	NW 2	Brahmaputra River	Assam	0.5	0.4	0.5
13	NW 4	Kakinada canal	AP, Telangana, Chhattisgarh, Karnataka, TN and Maharashtra	0.5	0.1	0.1
14	NW 16	Barak river	Assam	0.0	0.0	0.1
15	NW 73	Narmada river	Maharashtra and Gujarat	0.0	0.1	0.1
16	NW 91	Shastri river Jaigad river system	Maharashtra	3.4	0.1	0.1
				72.3	**73.6**	**~75**

1. All figures in MTPA – million tones per annuum
Source: IWAI

Exhibit 6.2 | Details of prioritised National Waterways

- 16 operational waterways
- 7 new waterways to be developed
- Eastern Waterways Connectivity Transport Grid (EWaCTG)
- 3 Multi-modal Terminals
- Freight Village at Varanasi and ICLP at Sahibganj
- PPP for 3 additional Terminals
- Coastal Integration



Initiative 6.1: Operationalize 23 waterways by 2030 by enhancing infrastructure across 10 functional waterways and developing 7 new waterways

A phase-wise plan to enhance terminal and allied infrastructure across 10 functional NWs by 2025 has been formulated (Exhibit 6.3). The NWs identified for infrastructure enhancement include – NW 1, NW 2, NW 16, NW-3, NW-4, NW 10, NW 44, NW 68, NW 97 and NW 111.

In addition to these, 6 NWs that are functional under the jurisdiction of state maritime boards have also been shortlisted for infrastructure enhancement. These include NW 73, NW 83, NW 85, NW 91, NW 94 and NW 100. The infrastructure works on these are expected to be completed by 2023.

7 new NWs having potential to unlock ~13-15 MTPA cargo capacity have also been identified for development on priority basis. The initial development works are expected to be completed by 2024. Details are given in Exhibit 6.4

Apart from terminal and fairway development, government has developed a freight village in Varanasi and an industrial cum logistics hub in Sahibganj. These facilities would act as a one stop location for manufacturers as well as transporters making IWT an attractive means of logistics.

Initiative 6.2: Enhance cargo movement across NWs through demand promotion and activation

Several demand activation measures to enhance cargo movement across NWs are proposed including –

- Outreach to potential public & private entities for cargo movement: Cargo owners located along the NWs may be identified and focused B2B discussion be held among IWAI, cargo owners, barge operators and logistics players to identify logistics and supply chain requirements
- Subsidies for an initial period of 3-5 years: Incentives may be offered for an initial period of 3-5 years to gain market share. For instance, subsidy to cargo owners for transportation on inland waterways may be considered for initial period of 5 years specially for distances up to 300 Km
- Policy interventions to promote industrialization along NWs: DPIIT and states should include provision/incentives for setting up of industries in proximity of NW. Some suggested measures include:
  - ¬ Rebate on land lease for industrial clusters near IWAI terminals
  - ¬ Offering multi-modal transport options & logistics zones within industrial clusters
  - ¬ Multi Modal Logistics Parks policy may emphasize establishment of freight villages in proximity to NWs
  - ¬ Joint Co-ordination Committee should be formed for development

6.3 Regional Connectivity with Bangladesh, Nepal, Myanmar and Bhutan

Among the NWs under development, NW 1 (Ganga-Bhagirathi-Hooghly system) and NW 2 (River Brahmaputra) hold immense significance as they connect the neighboring countries with India's hinterland. These waterways could be leveraged for EXIM with countries such as Bangladesh, Bhutan, Myanmar and Nepal. An estimate of key commodities that can be transported through IWs in the sub-region has been showcased in Exhibit 6.5

Bangladesh:

Currently movement between India & Bangladesh takes place under Indo-Bangladesh Protocol on Inland Water on Transit and Trade agreement which connects NW 1, NW-2, NW 16 and NW-97. Under this Protocol, inland vessels of both the countries can ply on the designated protocol route and dock at Ports of Call in each country, notified for loading / unloading of cargo. There has been significant improvement in the movement of cargo vessels in an organized manner on the protocol route carrying both the transit cargo to NE region of India and vice-versa and export-cargo to Bangladesh. Around 638 inland vessels (including 600 Bangladeshi flag vessels) completed approximately 4000 loaded voyages annually[4].

Presently, there are 10 routes, 11 ports of call and 2 extended ports of call under the Indo-Bangladesh protocol (Exhibit 6.6).

Exhibit 6.3 Planned Infrastructure Enhancement at 16 Functional National Waterways

NW-1	Infrastructure development plan	Fairway development, navigational aid and RIS
Phase 1	• 2 intermodal and 3 multimodal cargo terminals across to enhance connectivity and reduce cost of cargo – Haldia, Kalughat, Sahibganj, Varanasi, Ghazipur • 6 community jetties & 21 floating terminals across 6 cities along NW 1 • Development of navigation lock at Farakka along NW 1 • Develop an integrated vessel repair and maintenance complex near Sahibganj multi modal terminal	
Phase 2	• Freight Village at Varanasi • Industrial Cluster cum Logistic Park at Sahibganj • 4 Ro-ro terminals in 1st phase • Navigational fairway development to maintain Least Available Depth (LAD) of 3 m on the Haldia-Barh stretch; LAD of 2.5 m on the Barh-Ghazipur stretch; and LAD of 2.2 m on the Ghazipur-Varanasi stretch	
NW-2 (Brahmaputra)	• IWT terminal at Jogighopa • Ship repair facility at Pandu is under construction • Connectivity/ widening of road from Pandu to NH • Improvement of approach road at Dhubri Terminal	
NW-16 (River Barak)	• Upgradation of terminals at Badarpur and Karimganj	
NW-3 (West Coast Canal)		• Establishing river information system
NW-4 (Krishna)	• 4 pair of Ro-ro terminals by March 2024	• Navigational aids to be provided by March 2022 • River information system (need basis)
NW-10 (Amba River)	• Additional development of one floating pontoon	
NW-44 (Ichamati River)	• Additional development of one floating pontoon	
NW – 68 (Mandovi river)	• Provision of floating pontoon if required	• Provision of additional navigational aids for fairway identification for safe navigation by 2022 • River information system establishment by 2022
NW – 97 (Sunderban river)	• 2 additional floating pontoons by March 2023	• Provision of additional navigation aids deployment and River information system establishment by 2023
NW – 111 (Zuari river)	• Provision of floating pontoon if required	• Provision of additional navigational aids for fairway identification for safe navigation by 2022 • River information system establishment by 2022

Exhibit 6.4 Waterways prioritised for priority operationalisation

NW-1	Cargo potential (MTPA)	Infrastructure development plan	Fairway development, navigational aid and RIS
NW-5 (Brahmani river)	10-11	• Development planned for prioritized stretch between Pankhapal to Dhamra on Brahmani river • Additional studies ongoing to determine potential locations	
NW – 27 (Cumberjua river)	1-2	• Provision of floating pontoon if required	• Navigational aids for fairway identification for safe navigation by 2022 • River information system establishment by 2022
NW – 9 (Mandovi river)	0-1		• Provision of additional Navigational aids for fairway identification based on requirement • River information system establishment by 2022
NW – 86 (Rupnarayan river)	0-1	• Development of one floating pontoon	• Tidal river, dredging proposed for identified shoals to be completed - March 2023 • Navigation aids deployment and River information system establishment by 2023
NW – 57 (Kopli river)	0-1	• Additional development of one floating pontoon	
NW – 8 (Allapuzah canal)	-		• Provision of additional Navigational aids for fairway identification based on requirement • River information system establishment
NW – 52 (Kali river)	-	• Additional development of one floating pontoon	
Total	**13-15 MTPA**		

Source: TA 14 group discussions; National Waterway DPRs

Nepal:

The development of NW 1 from Varanasi to Haldia/ Sagar under the Jal Marg Vikas Project (JMVP) has also opened up opportunity for transportation of Nepalese cargo to/ from third countries via Kolkata Port using NW 1. Currently, Nepalese trade to/ from third countries primarily uses Kolkata Port (KDS and HDC) and hinterland transportation takes place using road and rail mode. Considering the availability and significance of IWT mode for hinterland transportation, India and Nepal have agreed to include inland waterways mode in the Treaty of Trade and Transit between the two countries. Inclusion of IWT mode will allow Nepal bound cargo (to/ from 3rd country via Kolkata port) to take the waterway route from Haldia/ Kolkata up to Sahibganj, Kalughat and Varanasi for onward movement by road. At present, following routes included in the treaty (Exhibit 6.7):

- From Kolkata via proposed Kalughat terminal
- From Kolkata via Varanasi MMT
- From Kolkata via Sahibganj MMT and Manihari

Exhibit 6.5 Key commodities identified for potential movement across the subregion

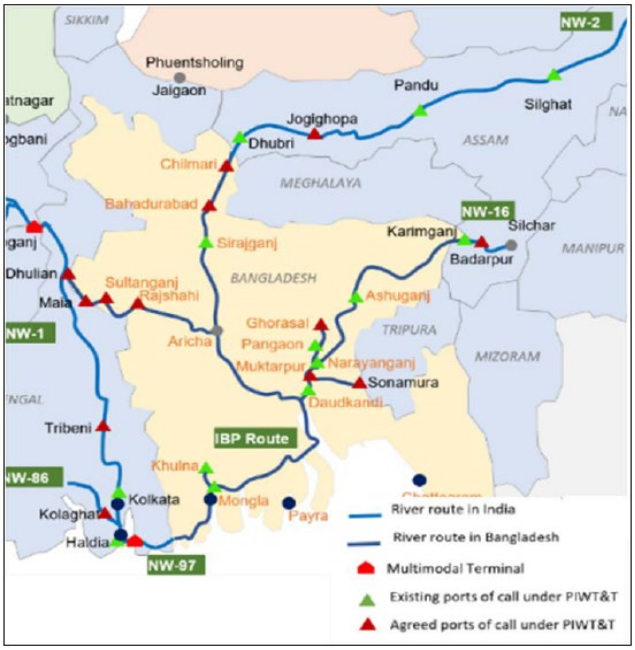
Key commodities identified for potential movement across the subregion

Commodity	Nature of trade flow	Total potential (million tonne p.a.)
Fertilizers	Domestic (Haldia – NER through IBP)	0.25
	Import (Kolkata - Assam through IBP)	0.11
	Transit (KoPT - Nepal)	0.60
Coal	Import (To NER through IBP)	0.25
	Transit (KoPT - Nepal)	0.80
LPG	Domestic (Haldia – NER through IBP)	0.45
Iron & Steel	Domestic (West Bengal/ Jharkhand – NER through IBP)	1.5
	Exports (Bangladesh)	0.40
	Transit (KoPT - Nepal)	0.02
Over Dimensional Cargo	NW-1 – IBP : Kolkata-Mongla, Khulna	FY20 - 16 shipments - 36,848 tones FY19 – 13 shipments - 20,808 tones
	NW-1 – IBP - NW-2 : Kolkata-Jogighopa	FY19 – 2 shipments – 981 tones

NER – North East Region

Source: IWAI – Inland waterways authority of India

Exhibit 6.6 Inland Waterway Connectivity with Bangladesh & proposed infrastructure enhancement



Infrastructure development plan

PPP on O&M basis for terminal at Dhubri, Pandu on NW2 and Badarpur, karimganj on NW 6

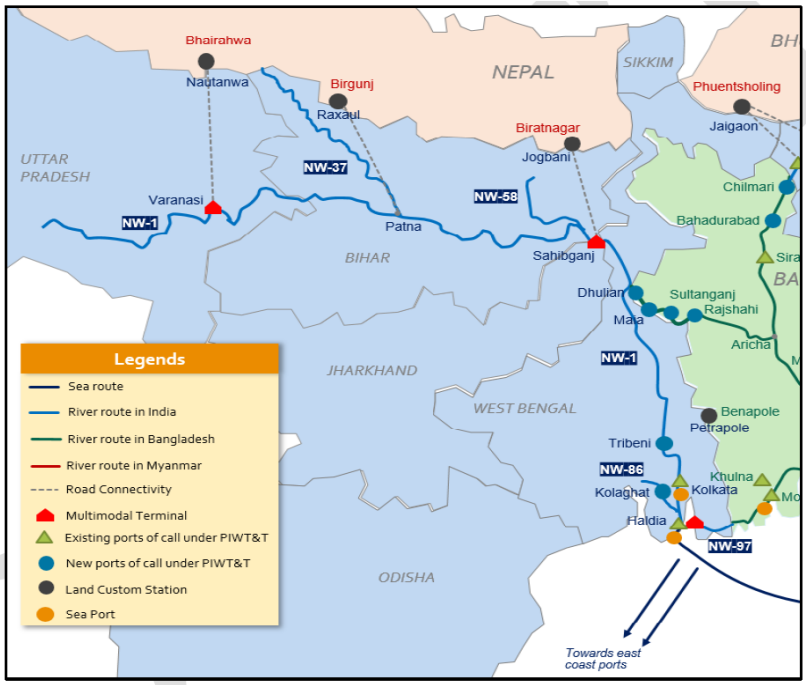
Terminal development at Sonamora in Gumti

Terminal development at Maia on Ganga river

Fairway development from Sirajganj to Daikhowa stretch in Jamuna river, and from Ashuganj to Zakiganj stretch in Kushiiyara

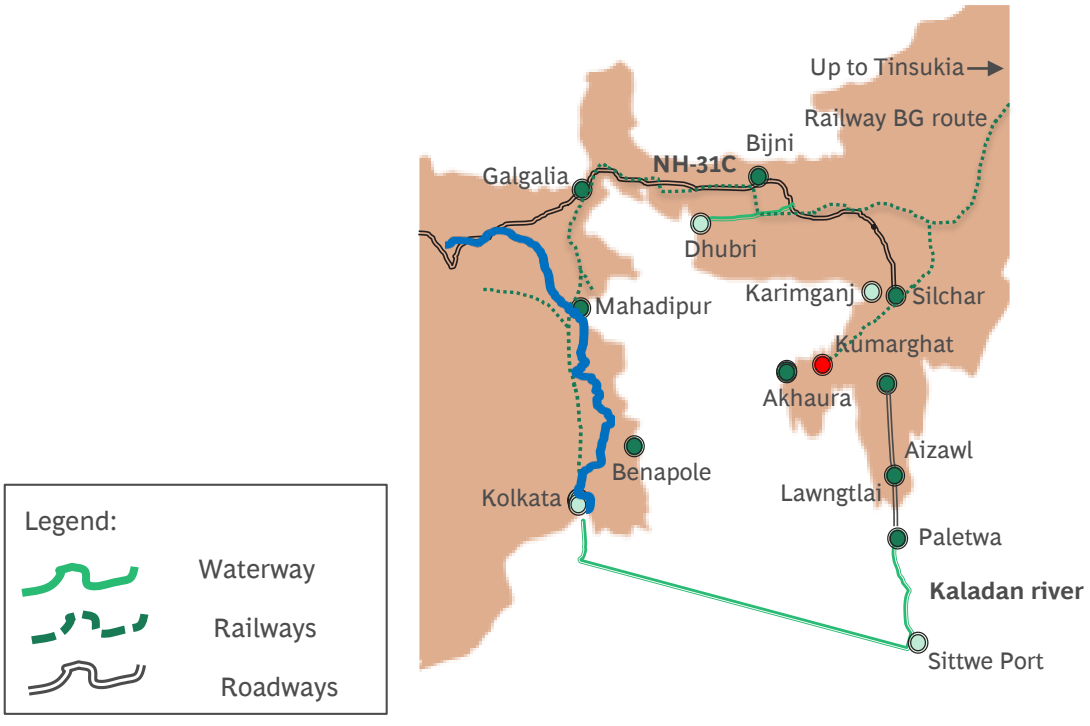
Source: TA 14 group discussions

Exhibit 6.7 Inland Waterway Connectivity with Nepal



Source: TA 14 group discussions

Exhibit 6.8 Inland Waterway Connectivity with Myanmar



Source: TA 14 group discussions

Myanmar:

The Kaladan Multimodal Transit Transport Project has been conceptualized by Ministry of External Affairs (MEA) to provide an alternative connectivity to the North Eastern Region of India with the Kolkata port and rest part of the country. The project envisages connectivity between Haldia/Kolkata in West Bengal through sea route up to Sittwe (539 km) in Myanmar. Thereafter through Inland Water Transport up to Paletwa (158 KM) and by road from Paletwa to Indo – Myanmar Border to Mizoram (110 km).

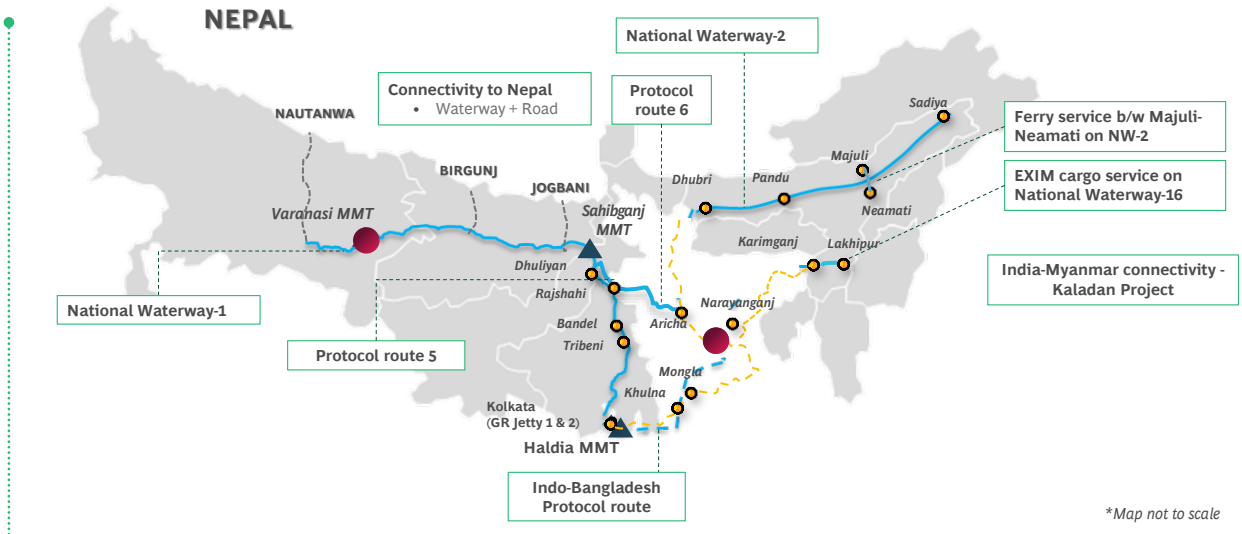
The development works under the protocol are already underway and Phase 1 of the same has been operationalized. Key development works under Phase 1 include (Exhibit 6.8):

- Construction of Port and IWT terminal at Sittwe
- IWT terminal at Paletwa
- Fairway development
- Construction of 6 IWT vessels & Other ancillary infrastructure
- O&M of the project is outsourced to a private player on long term revenue sharing basis

Bhutan:

The Inland waterways connectivity through the IBP route holds significance for Bhutan. As per the agreement on trade, commerce and transit between India and Bhutan, Dhubri on NW-2 is declared as an agreed exit/ entry point in India for EXIM cargo movement of Bhutan. Bhutan has been exporting significant quantity of stone aggregates through the land route for different construction projects in Bangladesh. Recognizing the benefits associated with waterways mode such as lower transportation cost, larger shipment size compared to road, redused congestion as prevalent on the land routes etc., stone exporters have started transportation of stone aggregates using the IWT mode. In FY19-20, more than ten shipments of 100 to 300 ton size using shallow draft vessels each took place from Dhubri to Chilmari, Bangladesh5 and the trade is expected to continue on the IWT mode in FY20-21.

Exhibit 6.9 | Proposed EWaCTG to enhance sub-regional connectivity



Initiative 6.3: Capitalize additional cargo and ferry potential by building multi-modal connectivity with 4 neighbouring countries through infrastructure development, fairway development and ecosystem development

Development of an eastern waterways connectivity transport grid (EWaCTG) connecting Nepal, Bangladesh, Myanmar and Bhutan will help in providing alternate, sustainable and cost-effective means of transport and EXIM trade (Exhibit 6.9).

For development of this transport grid infrastructure to enhance connectivity with each of these countries has been planned.

Country	Infrastructure Planned
Bangladesh	IW terminals at Sonamora and Maia are planned and are expected to be operationalized by 2024.
Nepal	IWAI is in the process of getting its Multimodal Terminals at Varanasi and Sahibganj Customs notified, which will enable movement of Customs bonded Nepal bound cargo through these multi-modal terminals. Joint efforts are being put by KoPT and IWAI to look at the possibilities of using IWT mode for shifting of cargo to IWT mode.
Myanmar	Phase 2 of Container handling facility at Sittwe & Paletwa with an estimated cost of INR 233 crores is expected to be operationalized by 2025
Bhutan	Jogighopa terminal on NW2 would provide an alternative trade option to Bhutan

6.4 Ro-Ro and Ferry services

India is one of the world's fastest growing economies and transport systems have always been a critical enabler for sustaining and indeed accelerating the level of growth. The ability to move people and cargo seamlessly and cost effectively from originating point to destination is a key driver for growth and jobs. IWs could play a significant role in lowering the cost of transportation, making India's logistics more competitive.

At present, ~145 million passengers are ferried across 9 states annually (Exhibit 6.10). Of this, West Bengal accounts for the highest share, followed by Kerala and Maharashtra.

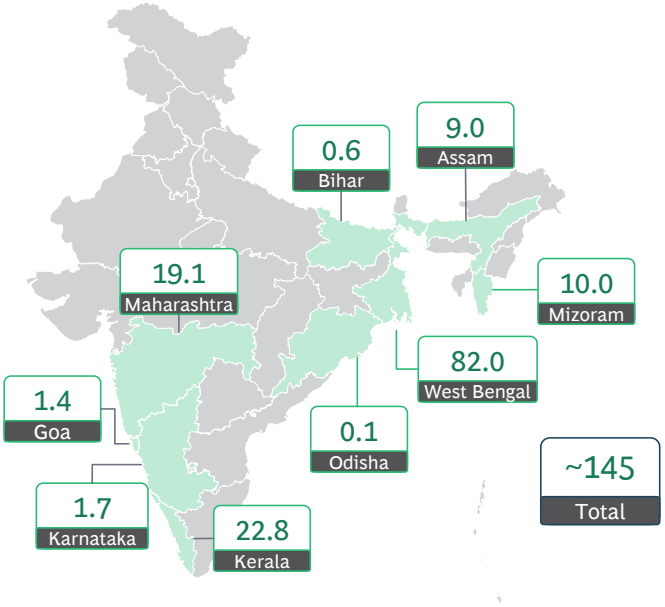
One of the key success factors in uptake of ferry services is system integration with other modes of transport and ensuring first and last mile connectivity. Globally, several countries like Australia, Norway, Hong Kong have undertaken measures to integrate their ferry systems with other modes of transport (Exhibit 6.11). Similar initiatives for instance have also been undertaken in Kochi to link the ferry services to Kochi Metro through usage of single Smart Card.

Meanwhile, Ro-Ro operations are currently functional across 3 NWs – NW 1, NW 2 and NW 4. Traffic details for each waterway have been given in the Table below:

Waterway	Traffic
NW 1	2.2 Mn. traffic across multiple points located on stretch between Kolkata and Rajmahal (Jharkhand) 0.7 Mn. traffic b/w Sahibganj and Manihari
NW 2	IWAI is plying 3 Ro-pax services in Assam on Dhubri-Hatsinghmari, North Guwahati – South Guwahati and Neamati – Kamlabari routes.
NW 4	Movement between Lingayapalam and Ibrahimpatnam is currently underway

Exhibit 6.10 State-wise ferry traffic in India

Ferry: Operations underway in 9 States with ~145 Mn. annual passenger



XX – Total passengers (Mn.)

Exhibit 6.11

Illustration: Multimodal connectivity at Hudson river, NY linking rail and ferry terminals for optimal transportation

Multi-modal link established for ferry

Development of bus and subway stations near ferry terminals

Single pass for different modes of transport to maximize user mobility

Linking modes of transportation increases connectivity across city

Easy transfer between ferry, rail and bus

Multi-modal connectivity for most New York Islands (Manhattan, Long, Queens)

Source: Press research, Company websites, Expert interviews

Hudson Go Pass!

Bus or Light Rail & Ferry

Subway stations

Ferry terminals

The current Ro-Ro movement is limited and has growth potential. Development of modern infrastructure and formalization of operations are planned to boost traffic on NWs.

Initiative 6.4: Develop 10+ Ro-Ro terminals in partnership with State government

Over 10 Ro-Ro terminal/ jetty locations have been identified across NW 1. The Ro-Ro services are largely expected to benefit the local farming community in transporting their goods.

Along the Eastern Bihar and Jharkhand stretch 5 community jetty and Ro-Ro routes have been identified (Exhibit 6.12). Development of these would help in transportation of local farm produce like Mango, milk and also stone chips.

Additionally, five routes have been identified along the West Bengal stretch of NW 1, which could be used for transportation of onion, potatoes and fish (Exhibit 6.13).

The EWaCTG could be leveraged to offer Ro-Ro services in the North Eastern part of the country. Six potential locations for development of Ro-Ro infrastructure have been identified for the same (Exhibit 6.14).

Initiative 6.5: Develop Ferry terminals across 60+ locations in partnership with State government on Arth Ganga model

Development of ferry services could help ease the congestion significantly, especially in urban areas. Ferry terminals/jetties are planned along the Kolkata-Haldia stretch, Varanasi and Patna Region. The highest number of terminals are planned in the Kolkata-Haldia stretch, which include 13 hubs, 16 terminals for tourism and 11 for goods movement (Exhibit 6.15).

Exhibit 6.12 Community and Ro-Ro Jetties identified in Jharkhand and Bihar

Mango (~10-15 tons) | **Milk** (~1-2 tons) | **Vegetables** (~5-10 tons) | **Stone chips** (~1200 tons) | **Fish** (~2-2.5 tons) | **Silica Sand** (~500 tons)

Kahalgaon – Tintanga (ferry)

Samdaghat - Manihari

Rajmahal - Manikchak

Type	Origin	Destination	Road Cost	Iwt Cost	% Savings
Ferry	Kahalgaon	Tintanga	Rs 3,509/ ton	Rs 2,332/ ton	34%
Ferry	Samdaghat	Manihari	Rs 3348/ ton	Rs 3,053/ ton	10%
Ferry	Rajmahal	Manikchak	Rs 2358/ ton	Rs 1,799/ ton	24%
Stone chips	Samdaghat	Manihari	Rs 17,135/ truck*	Rs 13541/ truck*	21%
Silica sand	Rajmahal	Manikchak	Rs 13,247/ truck*	Rs 6490/ truck*	51%

***20 ton truck including empty return**

Direct benefits:

- Logistics cost reduction, Reduced truck traffic congestion
- Distance savings 50 – 100 Km
- No middle man issues. Farmers can directly reach to market

Annual cost savings per farmer without middle man

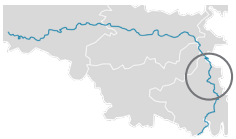
Rs 20,000 – 40,000 (mangoes)

Rs 30,000 - 40,000 (vegetables)

Source: Inland Waterways Authority of India (IWAI)

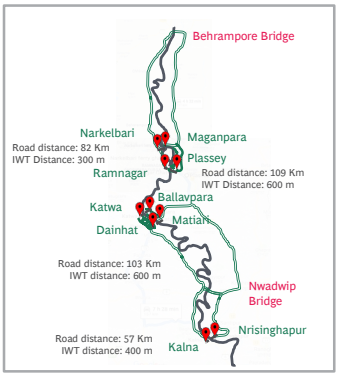
Exhibit 6.13 Community and Ro-Ro Jetties identified in West Bengal





Daily volume	Onoin & Potato (~500-1000 tons combined)	Fish (~1-2 tons)

Origin	Destination	Road Cost (Rs/Truck)	Iwt Cost (Rs/Truck)	% Savings
Kalna	Nrisinghapur	7,714	400	94.8%
Dainhat	Matiyari	10,220	400	96.1%
Katwa	Ballabhpara	10,715	400	96.3%
Palassey	Ramnagar	8,654	400	95.4%
Narkelbari	Maganpara	7,831	400	94.9%

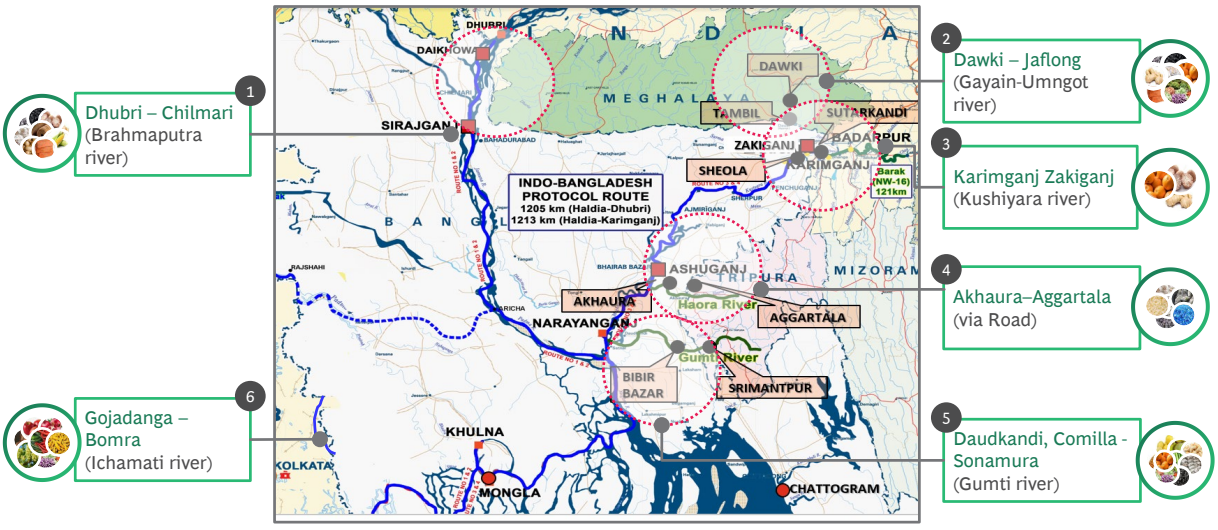


Direct benefits:

- Logistics cost reduction, reduced truck traffic congestion
- Distance savings in the range of 50-100 Km

Spurce: Inland Waterways Authority of India (IWAI)

Exhibit 6.14 Development of North Eastern jetties through EWaCTG



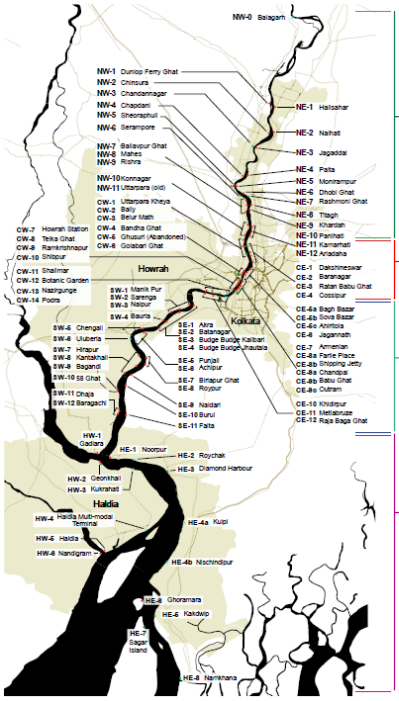
Varanasi and Patna have 7 planned terminals each.

Apart from NW 1, development of multi-modal link is already underway in Kochi wherein 38 boat jetties are planned to be connected to Kochi Metro through feeder services, including buses. This would not only facilitate better city connectivity, but also enhance public transport services at regional Greater Kochi level including 10 island communities (Exhibit 6.16).

Multiple waterways movement opportunities have been identified in Maharashtra across Mumbai, Palghar, Raigad, Ratnagiri, and Sindhudurg regions. Operational waterways and development of NW 53 will support decongestion of Mumbai's road traffic (Exhibit 6.17). There is high potential to leverage waterways in nearby districts as well. (Exhibit 6.18-6.20)

IWT opportunities should also be evaluated in Gujarat and Goa. At present there are three operational terminals in Gujarat – Hazira, Dahej and Ghogha. The network could be expanded to cover other locations along the coastline like Jamnagar (Exhibit 6.21). Similarly, Goa's urban transportation could also be enhanced through operationalization of ferry services. At present, Goa has one operational jetty, three under construction and 10 at planning stage (Exhibit 6.22).

Exhibit 6.15 Identified ferry terminal locations in Kolkata-Haldia region



Metro North
NW-1 to NW11
NE-1 to NE-12

CORE
CW-1 to CW14
CE-1 to CE-12

Metro South
SW-1 to SW12
NE-1 to SE-11

Haldia Area
HW-1 to HW-6
He-1 to HE-8

Legend
- Local/Regional/
- Tourist
- Goods

86 number of **total ferry terminals**

13 total number of **hubs**

16 number of terminals for tourism

11 number of terminals for **goods movement**

Integration with metro/ bus connectivity can be developed for last mile connectivity

Source: Report of MIT/TDG

Exhibit 6.16 | Metro transportation linked with Ferry terminals in Kochi

15 routes (around 78 Kms in length) connecting 10+ islands

45 terminals and 78 boats planned

Route Network – Phase 1

Route Network – Phase 2

Ro-Ro Vessels at Willingdon Island

Exhibit 6.17 | Inland Waterway System in Mumbai

Operational waterways

NW-53 Phase 1: 50 KM in length

NW-53 Phase 2: 93 KM in length

Other planned waterways routes

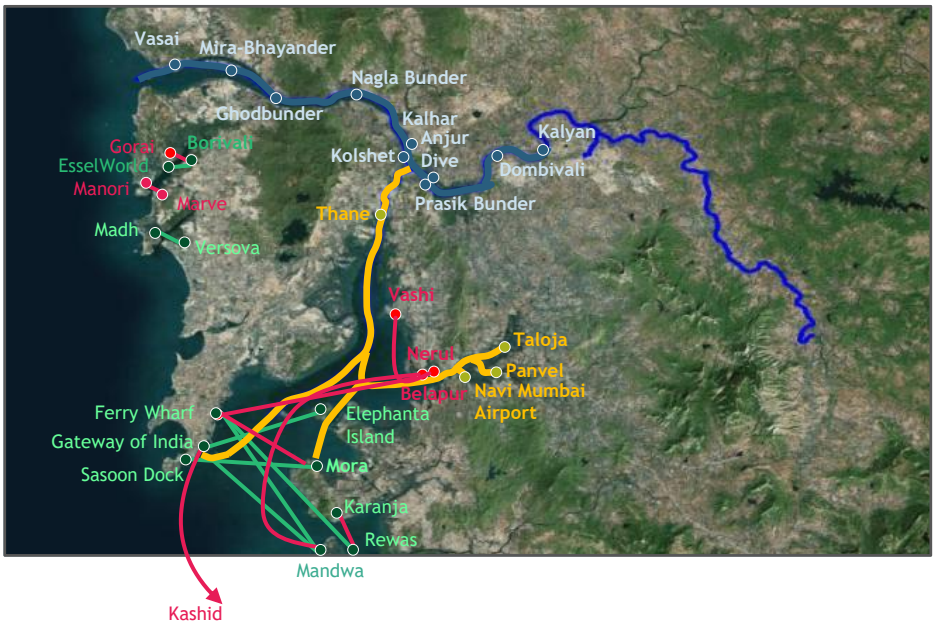


Exhibit 6.18 | Palghar waterways transportation

Exhibit 6.19 | Ratnagiri waterways transportation

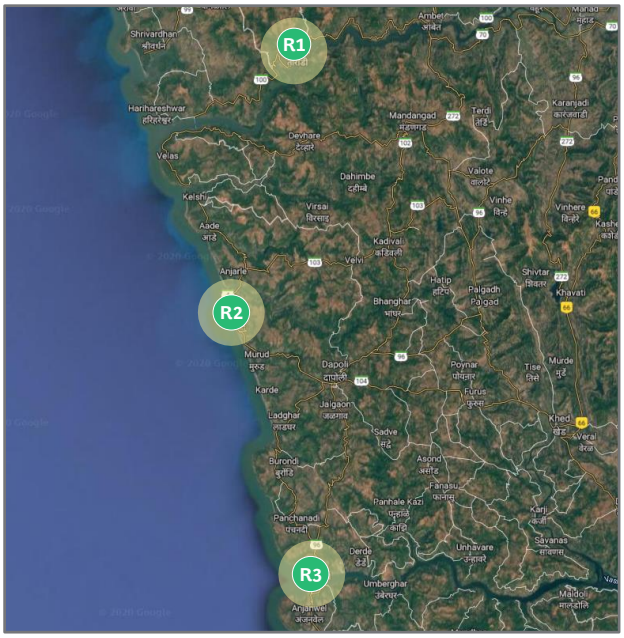


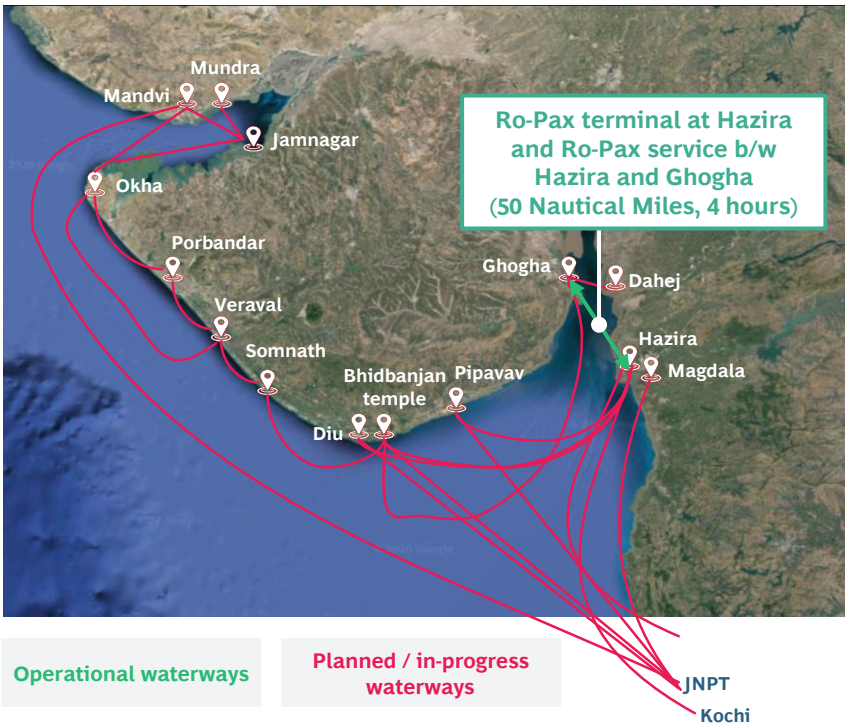
Exhibit 6.20 | Sindhudurg waterways transportation

Under implementation projects

Exhibit 6.21 | Development Opportunity in Gujarat

Operational

Future expansion



Operational waterways

Planned / in-progress waterways

Initiative 6.6: Leverage private participation for terminal development and operations

At present, operations on national waterways are governed by state as well as central authorities with limited integration and multiple overlaps. While the waterway is developed and maintained by IWAI, landside infrastructure is maintained by state governments. To avoid overlaps and conflicts a co-development model is recommended. Such models are already in implementation in the rail sector.

The joint development could be undertaken through a special purpose vehicle (SPV). The SPVs with respective state governments could help execute combined roles of center and state in an integrated manner for trade facilitation and growth. Once established the SPV could partner with private players for operations of Ro-Ro and ferry services and the terminal (Exhibit 6.23).

Private party engagement should be encouraged in operations of Ro-Ro and ferry service. Engagement of a private party facilitates synergies between it and the public entity. A PPP structure

Exhibit 6.22 | Proposed IWT network in Goa

Five routes operational / in-progress

- Other 8 jetties planned:
- Chorao Island
- Usgao Pale
- Driver Island
- Sinquirim
- Maritime school jetty
- Cortalim fishing jetty
- Cumbharuja ferry point
- Chapora

Exhibit 6.23 | SPV model for joint development of NWs

Illustrative

Model 1: National Waterway level SPV be created between IWAI and concerned states

1 Single SPV across IWAI, UP, Bihar, Jharkhand and West Bengal

Illustrative

Model 2: State specific SPVs created between IWAI and individual states

2 Single SPV with Maharashtra to overlook NW 10, NW 83, NW 85 and NW 91

Source: TA 9 group discussions

will augment the collective financial capability, operational capability and risk-taking capability of both parties for effectively meeting project objectives. Globally, private players have been involved in Ro-Ro terminal operations, fleet maintenance and operations (Exhibit 6.24). However, in case of India, private player could be engaged through O&M or management-based contracts in the initial years.

As compared to Ro-Ro services, engagement of private players is higher in ferry operations. In case of ferry, public authority sanctions the projects, but the development and operations are usually taken up by the private players. Countries like Belgium and US follow this mode.

The DBFOT model should be evaluated for engagement of private entity for proposed ferry terminals to channelize sector financing capabilities, along with its construction and operations expertise. Under this setup the private player would be responsible for terminal infrastructure development, maintenance, vessel procurement/leasing and operations. However, since ferry services are still in nascent stage in India, public agency might need to undertake the traffic and revenue risk i.e. the payment to private player should be base revenue with minimum guarantee.

Apart from the ferry and Ro-Ro terminals, opportunities for private investments are also present in development and operations of IW terminals. PPP operator needs to be appointed at 5 additional terminals - Dhubri, Sahibganj, Pandu, Slipway at Pandu and Gaighat, while the feasibility for private participation needs to be undertaken at Karimganj and Badarpur terminals along National Waterways 3.

Exhibit 6.24 Global Examples of PPP in Ro-Ro Operations

		UK (Dover)	France	Spain	Rotterdam	UK (Killingholme)
	Description	Development of infra by public sector, operations by private sector		Joint development of infra & private operations of terminals		Privately funded terminal infra & operations
Public Dominated	Waterway & terminal connectivity	Public	Public	Joint	Public	Public
Public Dominated	Terminal structure	Public	Public	Joint	Private	Private
Private Dominated	Terminal operations	Private	Private	Private	Private	Private
Private Dominated	Vessel Operations	Private	Private	Private	Private	Private
Private Dominated	Vessel Financing	Private	Private	Private	Private	Private
	Contract Duration				15 years	10-20 years
	Structure	Equip, Operate and maintain under PPP		OMT/BOT	BOT under PPP	BOT under PPP

Prevalent model

Source: Press Search; Expert interviews

6.5 Policy interventions for development of IW sector

In order to encourage the uptake of IWT government needs to offer fiscal benefits to the operators as well as users. Reduction in taxes, removal of tax anomalies and bringing flexibility in operations could act as an incentive to shift traffic from road/rail to IWT. Similar measures have been undertaken in Europe to encourage use of IWs (Exhibit 6.25).

Initiative 6.7: Reduction in GST rate on input services availed by IWT operators to enable lower mismatch in GST input credit and reduce overall cost of operations

It is proposed to reduce the GST rate to 5%, against the current 12%. GST rate on multimodal transportation is 12%, while that on single mode of transport like road or rail is 5%. As coastal movement is mostly a multimodal movement, effectively, GST rate for coastal movement becomes 12% putting it at a disadvantage.

Further, there is a need to modify the GST law to resolve the input tax credit related issue.

Initiative 6.8: Enhance integration of inland waterway movement with coastal traffic through modification in vessel policy regulations

Relaxation of the operational guidelines to qualify the inland vessels for movement at the 2 m wave height should be evaluated. This would lead to greater availability of vessels for use in the inshore corridor and boost cargo on coastal shipping routes.

Additionally, relaxation of the currently fixed window of fair season months declared by DG Shipping should also be assessed. The relaxation would allow Inland Vessels complying with SOC requirement (DG Shipping order No. 8 of 2008) to do integrated coastal and river movement during higher number of months

Initiative 6.9: Leverage private participation in dredging operations on royalty-based PPP model to promote sustainable development and "Waste to wealth'

Capital / maintenance dredging works on the inland waterways work is undertaken either departmentally or through open tendering. Opportunities to award long term contract for maintenance dredging with a minimum period of five (5) years should be evaluated. Contractor should be given exclusive rights to dispose / sale off the dredged material by paying royalty charges to the State Government. As per the proposed framework, the contractor would get exclusive rights to dispose / sale off the dredged material as per state regulations against payment of royalty.

Exhibit 6.25 Marco Polo Program in Europe Designed to Incentivise movement through waterways

Objective of Marco Polo Program	Subsidies Offered	Impact Generated
The plan aims to reduce road truck traffic by 700,000 per year between Paris & Berlin Key focus areas • Reduce urban congestion • Enhance intermodal transport • Reduce transport impact on environment	Subsidy of 35% on the eligible costs/incurred costs Ancillary infrastructure costs are eligible for a subsidy of 20% of the total eligible costs (total subsidy limited to 2 euros for each shift)	Impact of Ro-Ro Past France • Project developed "motorway-of-sea" between Spain & Belgium. • Cargo volume shifted: 8.4 billion tonne-km Approximately 200 such projects have been sanctioned under the project

Source: European Union; Press search

The dredged material could be reused for sustainable projects like wetland restoration, habitat enhancement or beach nourishment.

6.6 Conclusion and Summary

India has prioritized development of 23 NWs in the next 10 years, which are expected to increase the goods traffic by 2x. However, to achieve this significant development in infrastructure is required. Additionally, efforts would also be required to activate demand and garner private participation.

As part of Vision 2030, globally benchmarked targets have been defined to enhance inland waterway traffic and improve the sector performance (Exhibit 6.26)

The specific initiatives and the prescribed phasewise roadmap in this chapter will further assist the achievement the set KPIs within the defined timelines. With the suggested measures, the share of IWT can increase from 2% at present to ~5% by 2030.

Exhibit 6.26 | KPI targets and impact

	Key performance indicators	Current	Target (2030)
1	# of operational National waterways for Cargo and ferry movement	16	**23**
2	Annual cargo moved on National Waterways	73 MTPA	**>200 MTPA**
3	Modal share of Inland cargo movement	2%	**5%**
4	Annual passengers moved by ferry operations	14 Cr.	**70 Cr.**

CHAPTER 7

Become a Global Hub for Cruise Tourism

Become a Global Hub for Cruise Tourism

7.1 Current landscape

Tourism today is one of the largest global industries and a significant engine for economic growth and employment generation. Globally, strong economic growth has led to the emergence of millions of new travellers looking for exceptional travel experiences, whether business or leisure, domestic, regional or international. This trend is expected to continue with sustained momentum, outpacing global economic growth.

Cruise tourism is a niche sector representing approx. 2 percent of the overall global travel industry and has experienced a steady growth of ~7% in the last three years, led by contemporary and premium cruises. Cruise tourism presents a strong global opportunity today.

India has enhanced its focus on Cruise sector with The Ministry of Tourism and Ministry of Ports, Shipping and Waterways actively promoting cruise tourism for its vast economic impact, the potential for job creation, and for earning foreign exchange. India has effected several improvements such as construction of new terminals, development of a regulatory environment, cabotage relaxation regime, discounted tariff policy, ongoing revision of standard operating procedures (SOPs), intensive marketing engagement with leading cruise operators, and organizing workshops / conferences in India. These initiatives have resulted in a rapid ~35%+ growth in the cruise market in India in the last three years.

GoI's vision is to make India a significant player in the global cruise market, both for ocean and river cruises. Indian cruise market has the potential to grow by 8X over the next decade, driven by rising demand and disposable incomes. Development of infrastructure is the most critical bottleneck to unlock demand and requires an optimized development and phasing strategy. With the global ocean cruise industry being highly concentrated (80%+ share with top three players), an attractive and stable policy framework is also essential for attracting international players to India.

The river cruise industry is at a nascent stage in India, with an initial focus on NW 1 (Ganga) and NW 2 (Brahmaputra) servicing ~13,000 passenger movement in 2019 across 100 cruise trips. However, the current challenges in terms of infrastructure, availability of appropriate vessels and lack of awareness need to be addressed to unlock potential.

In order to promote India as the global destination for cruise tourism under MIV 2030, interventions are required across three key areas:

1. Oceanic and Coastal Cruise
2. Island and Infrastructure Development
3. River and Inland Cruise

7.2 Oceanic and Coastal Cruise

Globally, the cruise industry has experienced a steady growth of 6% CAGR in the last few years, with new and premium cruises accounting for more than 50% of the current market. (Exhibit 7.1).

Global economies have undertaken a structured approach to drive the development of the cruise market. Asia has a lower average length of cruise with majority of the voyages lasting 2 to 5 days, possibly owing to differing vacation practices, when compared to 7 to 10 days in Europe and the Caribbean regions. Regional cruises have dominated the Asian market, with 95% cruise capacity in Asia accounted for by regional cruises.

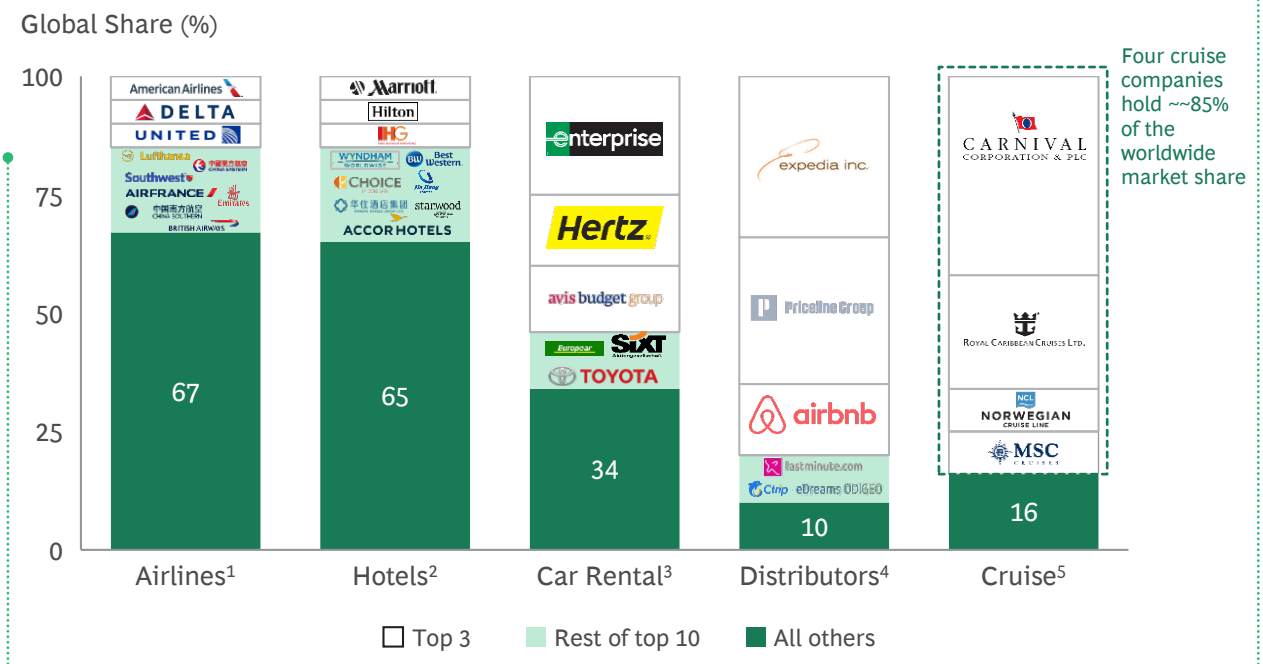
The Indian cruise market is small but growing steadily driven by rising disposable incomes and government interventions. The Government has taken several measures in the last five years to boost the growth of cruise passengers. Some notable interventions are mentioned below:

- Foreign flag vessels carrying passengers allowed to call at Indian ports till Feb 2025 without obtaining a license from the Director General of Shipping
- Standardized Operating Procedures (SOPs) for cruise vessels have been revised and operationalized w.e.f. November 2017 at all Major Ports
- E-visa facility has been extended to five seaports, namely Mumbai, Mormugao, New Mangalore, Cochin and Chennai
- Reduction of port charges with all Major Ports required to charge a uniform single rate per GRT

for the first 12 hours of stay

- 40-50% concession on composite port charges to domestic cruise vessels with no priority/ousting/ shifting charges for berthing the cruise vessel
- Walk-in berthing/preferential berthing to homeport cruises without any extra charges
- Upgradation of cruise facilities in various ports

Exhibit 7.1 | Industry-Wise Market Share in Global Tourism

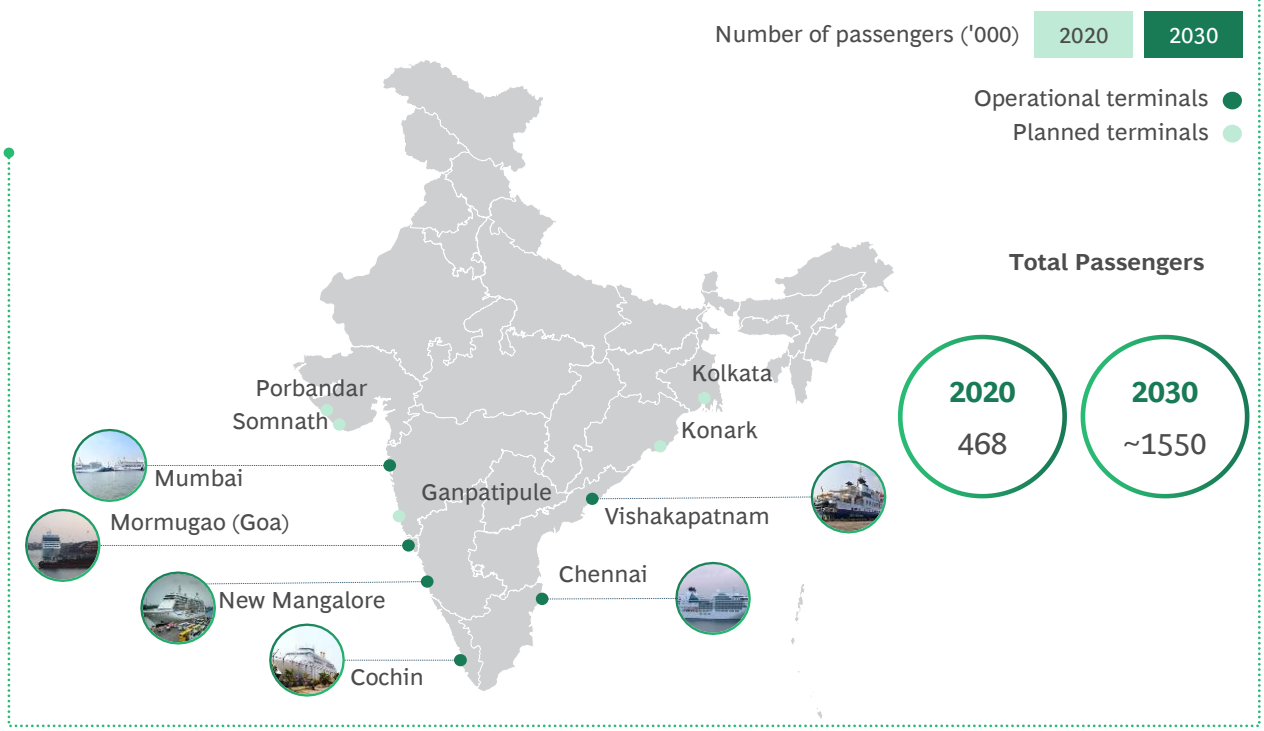


1. Share of Global RPKs for 2015. Source: IATA, Airline Business 2. Share of global hotel rooms 2015. Source: STR, Hotels 325 Publication 3. Share of retail sales 2015. Source: Euromonitor 4. Share of global gross bookings. Source: Skift, PhoCusWright 5. Cruise industry news 2019 Annual report – 32nd edition

Potential demand for cruise in India is likely to increase by ~8 times over the next decade to reach 1.5 Mn by 2030. Indian consumer growth is will see a significant rise of "affluent" and "elite" segments in the next 5-10 years. Growth will be primarily driven by the following factors:

- Increasing income and growing GDP
- Infrastructure development for meeting domestic and international demand
- Easing immigration and customs policies
- Multiple itineraries and port options to encourage domestic tourists

Exhibit 7.2 | Current and potential cruise terminals



Initiative 7.1: Infrastructure development and enhancement at select 12 ports for domestic and international cruise terminal development

Cruise tourism in India has remained limited to six major ports – Mumbai, Mormugao, New Mangalore, Cochin, Vishakapatnam and Chennai. These six locations have seen construction and expansion of cruise terminals and six new locations – Kolkata, Porbandar, Ganpatipule, Diu, Somnath, and Konark – have been identified for promoting cruise operations (Exhibit 7.2).

1 Mumbai International Cruise Terminal

In addition to the existing cruise terminal in Mumbai, a modernized International Cruise Terminal is being developed to match international standards and accommodate a more significant number of vessels/tourists. This project is estimated to cost about Rs. 300 crores and is likely to be operational by December 2021. The new terminal building will comprise commercial areas such as retail/merchandise, restaurants, convention and entertainment zones.

2 Mormugao Cruise Terminal

Mormugao Cruise terminal is envisaged to act as a gateway to Goa and will also have a facility for Ro-Pax and Ferry Services, enabling Cruise passengers to crossover to North Goa and other tourist destinations. The project's estimated cost is Rs. 101.72 Crore, and it is likely to be completed by June 2022. A new well-equipped building is planned to house both International and Domestic Cruise Terminals with other facilities such as duty-free retail, lounges, food courts, etc. An ancillary commercial building is expected to have an experiential shopping zone aimed at cruise tourists and also accessible to general public.

3 New Mangalore Cruise Terminal

New Mangalore Port currently has a dedicated cruise lounge, with e-VISA clearance on arrival, fast immigration check, baggage scanners, currency exchange, etc. Recently, a new helicopter service has commenced and connects the port to important tourist destinations such as Bekal Fort, Dharamshala, Subramanya and Halebeedu-Belur. With increasing demand, a world-class infrastructure could transform the international cruise scenario at the port. Dedicated access road and entry for cruise terminal, beautification, landscaping at Panambur beach and Gurupura river near the port are currently underway.

4 Cochin Cruise Terminal

While the present cruise terminal includes all activities required for embarking and disembarking of passengers, an upgrade to International standards is expected to transform the international cruise scenario at Cochin Port. The terminal is planned to have a dedicated Kochi Haat to promote local handicrafts, parking facilities and more.

5 Chennai Cruise Terminal

Chennai cruise terminal is planned to be transformed into a state-of-the-art international and domestic cruise terminal with modern escalators, aerobridge systems, PA systems and scanners. Moreover, a specialized Cruise tourism facilitation center has been planned at the terminal for activating further demand.

Six other locations have been identified for tourism development given their high demand activation potential:

Locations	Demand activation potential
Ganpatipule	Beaches and temples e.g. Malgund beach, Advika beach, Chandrikadevi temple, Rameshwar temple, etc.
Diu	Portuguese Heritage and Forts, Gateway to Gujarat, and popular beaches
Porbandar	Mahatma Gandhi's birthplace, popular trading hub, temples and dams
Somnath	One of the top Hindu pilgrim centers, historical significance, beaches and museums
Konark	The 10th Century Sun temple, a UNESCO World Heritage Site and a popular tourist destination
Kolkata	Famous Indian metropolis, Gateway to Eastern India, monuments, museums, shopping, and other cultural attractions

Initiative 7.2: Ecosystem development at 4 theme based coastal destination circuits to activate cruise demand

Four themes based coastal destination circuits have been prioritized to provide initial activation to cruise demand along the Indian coastline:

- **Gujarat – Pilgrimage tours**

In collaboration with tourism and local authorities, Gujarat can be developed into a dedicated circuit for pilgrim tourism to tap into the existing huge market of ~4 million tourists visiting Dwarka, Veraval, Somnath, Porbandar and Diu (Exhibit 7.3). Existing ports along the state coastlines could develop infrastructure facilities for linking sea with land. Local collaboration opportunities can be explored with car rentals, hotels and day tour operators.

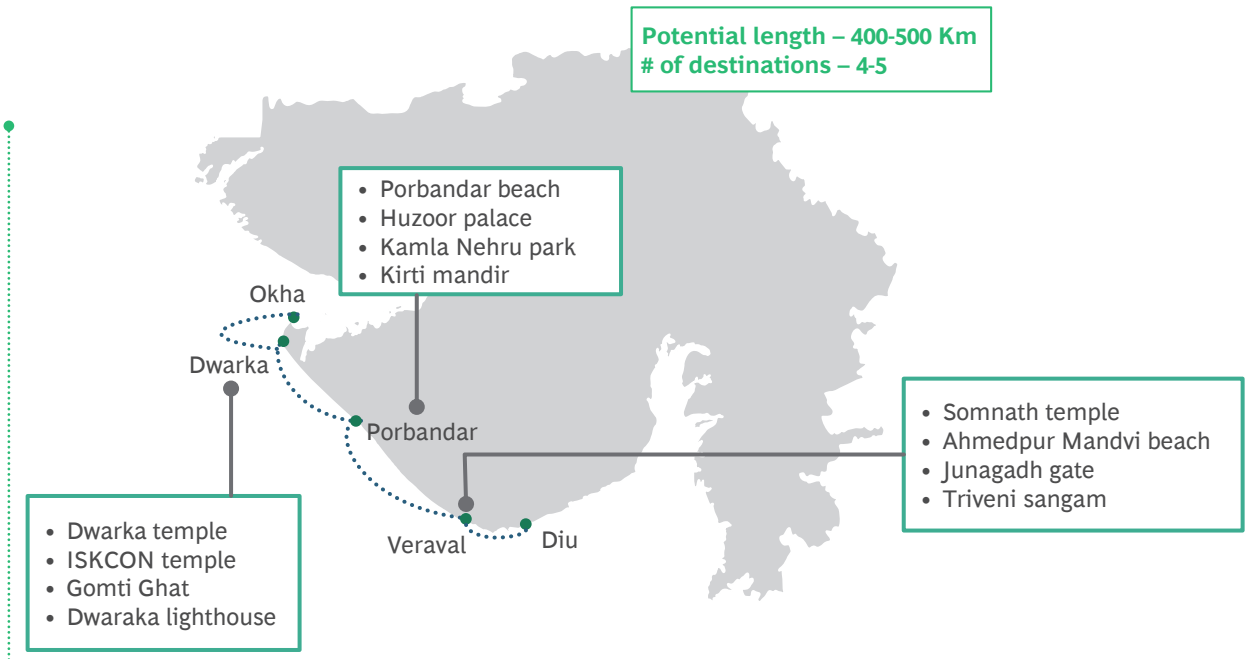
- **West Coast – Cultural and scenic tours**

History and culture circuit can be developed on the Western Coast (Exhibit 7.4) with attractions like Sindhudurg and other forts, historical, trading, temple and beach destinations and backwaters of Kerala, which can be leveraged to create short-medium duration cruises on small cruise boats.

- **South Coast – Ayurvedic wellness tours**

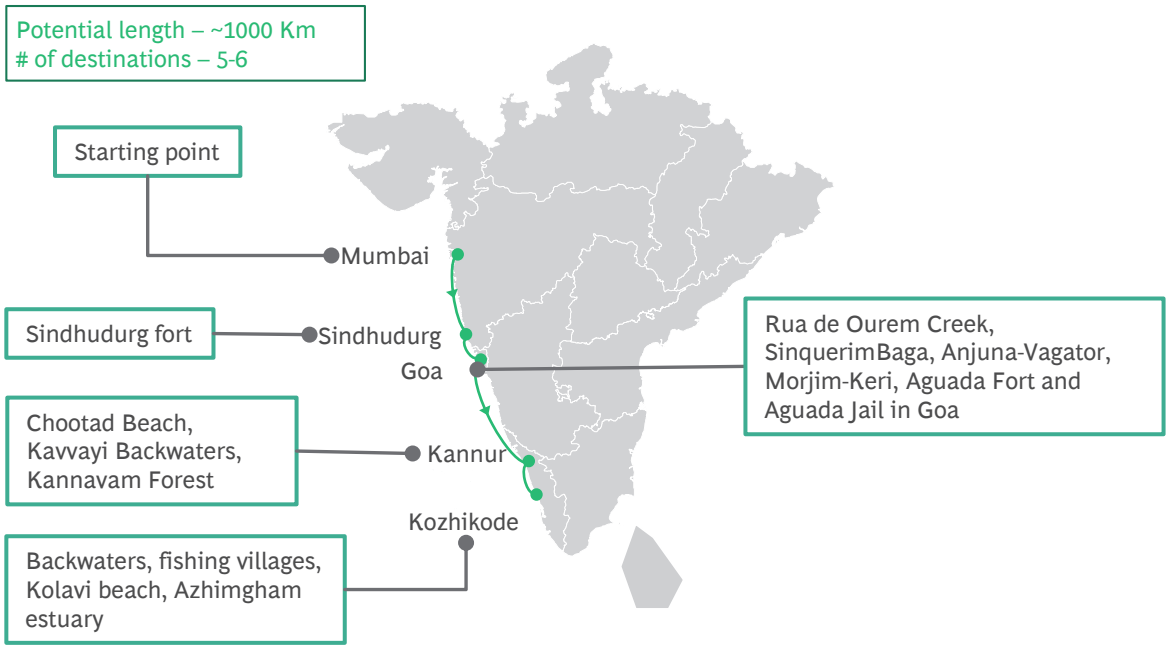
Kerala's coastline can be harnessed for Ayurvedic wellness and scenic tourism in collaboration with tourism and local authorities (Exhibit 7.5). Existing ports along the state, cultural heritage and biodiversity can be leveraged to build the circuit. Local collaboration opportunities can be explored with 50+ Ayurvedic wellness centers, car rentals, hotels, etc.

Exhibit 7.3 | Proposed pilgrimage circuit across Gujrat's coastline



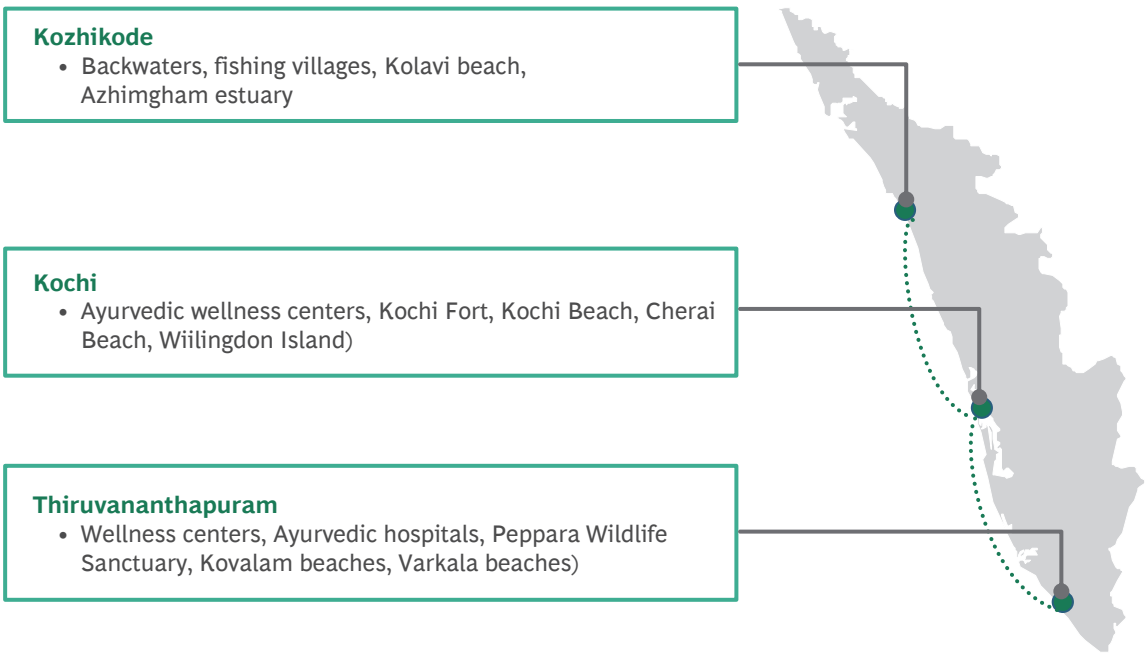
Source: Vibrant Gujarat Report, TA 6 group discussions

Exhibit 7.4 | Proposed history and culture circuit on the West Coast



Note: Ministry of Tourism has sanctioned development of Sindhudurg and Goa under coastal circuit scheme; Kannur and Kozhikode are promoted by Kerala Tourism Department
Source: Ministry of Tourism; Kerala Tourism Department, TA 6 group discussions

Exhibit 7.5 | Proposed ayurvedic wellness circuit on the South Coast

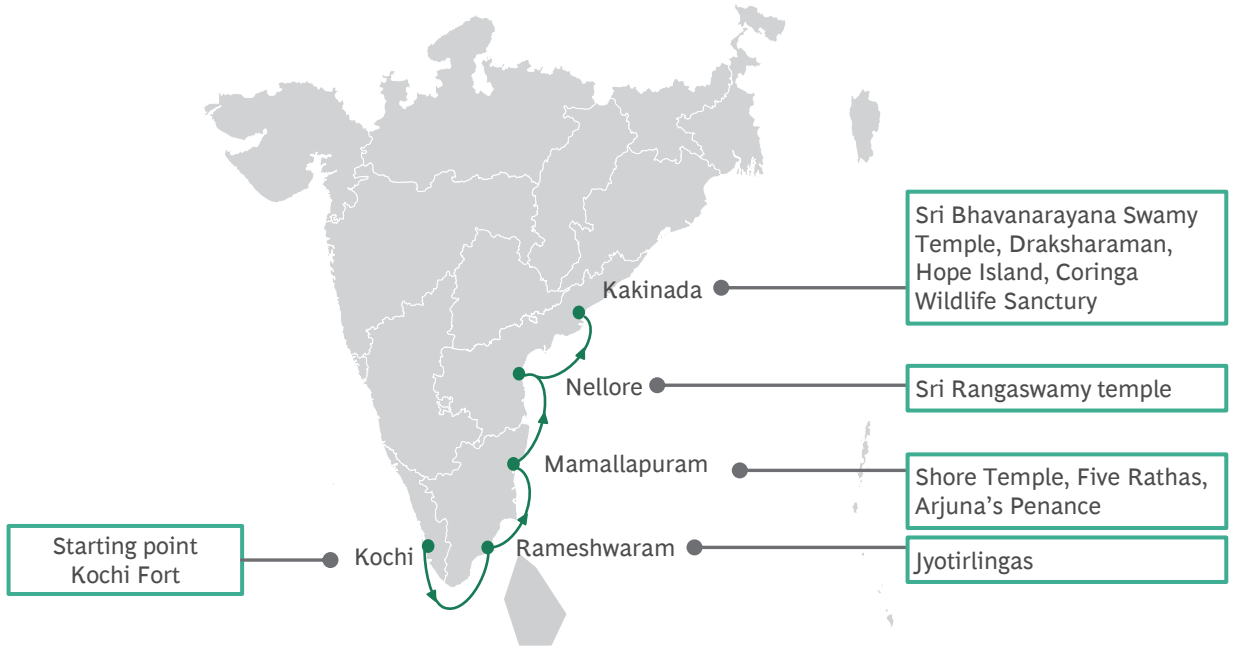


Source: TA 6 group discussions

- **East Coast – Heritage tourism**

Heritage attractions on the Eastern coast like Mahabalipuram, Sri Bhavanarayana Swamy Temple, can be leveraged to create heritage theme circuits, to cater to the significant demand from both domestic and foreign tourists (Exhibit 7.6)

Exhibit 7.6 | Proposed heritage circuit on the East Coast



Note: Ministry of Tourism has sanctioned development of Kakinada, Nellore, Mamallapuram & Rameshwaram under coastal circuit theme of Swadesh Darshan
Source: Ministry of Tourism, TA 6 group discussions

Initiative 7.3: Development of domestic and International ferry circuits across India, Sri-lanka, Thailand and Myanmar

India's geographical location makes it a viable winter cruise destination for 6-8 months, complementing the Mediterranean summer routes. Island and regional cruises can help harness opportunities spanning across the coastline. Longer circuits can potentially be explored along Indian and foreign coasts on small-ship cruising (Exhibit 7.7). Segments within the circuit could make coastal shipping a routine activity for domestic and foreign tourists. Coastal and island cruising can be conducted on smaller ships with lower draft and infrastructure requirements reducing the capital investment burden.

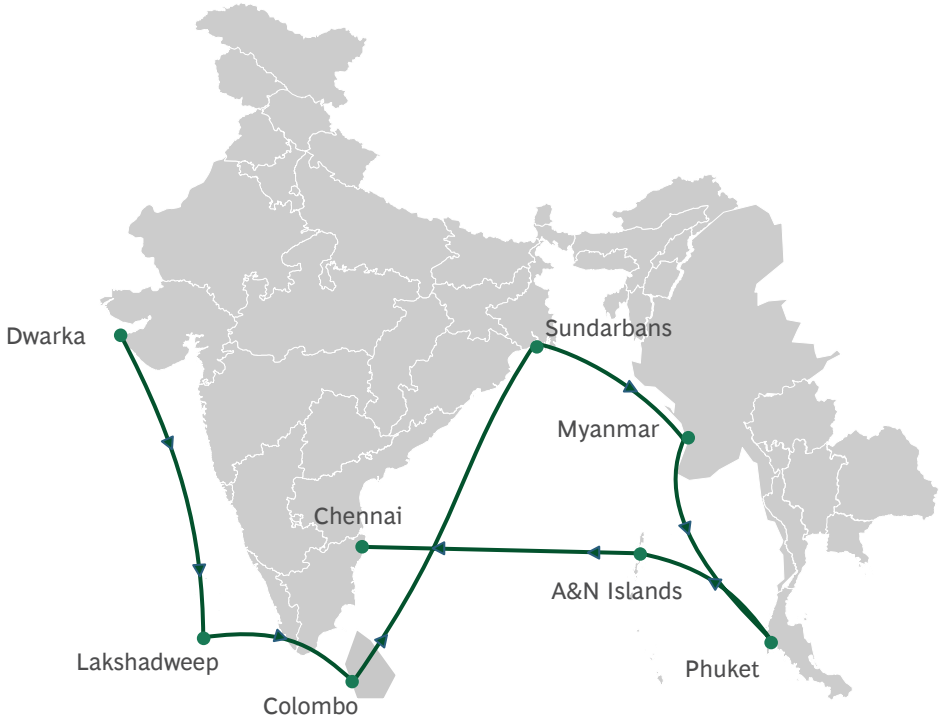
International and domestic ferry services can be leveraged to enhance passenger and Ro-Ro movement across major coastal districts. For example, a ferry service is envisaged and planned to launch between the port at Karaikal and Jaffna in Sri Lanka as part of the Puducherry government's initiative to promote tourism.

Initiative 7.4: Finalize Public Private Partnerships (PPP) model for cruise terminal operations and management

Global Ports have driven world-class terminal operations through various PPP models with varying degrees of involvement for ports (Exhibit 7.8). There is a need to attract foreign operators with a background in cruise terminal development and operations, networks in the industry and access to cruise operators to support rapid growth of cruise tourism along the Indian coastline.

Terminal operations are a specialized service that can benefit from private sector efficiencies. Passenger fee collection is an integral part of terminal development user charges. There is an in-built incentive for the developer-cum-operator to improve the service and get more passengers to utilize terminal facilities.

Exhibit 7.7 | Illustrative circuit spanning Indian and foreign destinations



Source: TA 6 group discussions

Exhibit 7.8 | PPP models for operations and management of Cruise terminals

	Only port authority	Authority + private developer	Cruiseline driven development		
	A Public Port	B PPP/Joint Venture	C Cruise-line with port authority	D Cruise-line with private investor	E Cruise line-driven
Description	Port authority is responsible building & operating the port asset	Development by port authority/in joint venture with private developer; Operations responsibility of pvt developer	Authority responsible for infra development; terminal operations by cruise lines	Authority responsible for core infra development; investing companies & cruise line responsible for traffic and management	End to end development and management led cruise line; port authority receives premium/rental
Role specifics	Infrastructure development by port authority	Infrastructure development by port authority/pvt dev	Infrastructure development by port authority	Initial infrastructure by port authority	Oversight by port authority
	Operations by port authority	Operations by private developer	Operations by cruise line	Infrastructure enhancement by private investors	Cruise line-led investment
				Operations by cruise line	Partner provides value added services

High — Degree of port involvement — Low

Source: Press Search

Initiative 7.5: Establish a dedicated cruise action team under Indian Maritime Centre to establish strong governance and overview mechanism

A dedicated Cruise action team governed by Executive committee of "Indian Maritime Centre" has been proposed to manage the sector growth

This action team will act as a single point of contact for all public and private stakeholders for cruise in India. Representatives from concerned ministries will be part of the action team and expected to work jointly on the promotion of the cruise sector.

Initiative 7.6: Custom charges optimization and standardization

International cruise ships with foreign passengers' on-board call on Indian ports enroute from one foreign port to another foreign port. An international cruise ship may call at one or more ports in India. Cruise ship operators have been expressing concern over several restrictive customs duties over the last few years, including on on-ship activities and service of certain consumption items like alcohol. Given the long-term growth potential of the cruise sector, its positive impact on the economy, and job opportunities in India, there is a strong case for simplification and standardization of custom levies in line with benchmarks and airport operations:

S No.	Areas of interest	Current challenge	Recommendations
1	Custom duty in exclusive economic zone	Custom duties are levied for consumption within 200 nautical miles from Indian shores	Custom duties limit should be brought down to 12 nautical miles
2	Custom process for passengers	Passengers and crew must have a custom declaration form, which is not required at airports	Custom process for cruise should be identical to that of arriving via air. Thus, a green lane/red lane system should be implemented at the Cruise Terminal

Initiative 7.7: Streamline GST related issues for cruise terminal/line operators

Five financial incentives have been identified to streamline cruise terminals / lines operators and grow Indian market:

S No.	Areas of interest	Current challenge	Recommendations
1	Onboard taxation transactions	Domestic vessels are taxed for on-board transactions	Zero taxation for on-board transactions for international foreign cruise should be extended to Indian vessels for 5-10 years
2	Higher GST incidence on cruise passengers	GST on airline ticket booking is lower (5% economy and 12% for business) as compared to cruise ticket booking (18%)	Aviation like tax rates can popularize cruise shipping in India and hence levy should be reduced to 5-12%
3	GST on import of Cruise Ships	Lack of cruise ship-building facility in India implies high import of cruise ships with IGST levy	IGST levy to be eliminated since even in pre-GST regime, import was exempted from such levy
4	Taxation on cruise ticket booking	Globally cruise ticket bookings are exempted from taxes due to significant advance booking	Tax incentives on ticket sales and shore excursions normally sold by domestic providers as a package to cruise lines should be considered

Initiative 7.8: Development of new Standard Operating Procedures (SOPs) and training manuals for immigration center, ports, PHO, CISF etc.

SOPs across the value chain (arrival process, terminal facility operations, and departure process) are necessary to ensure uniform and coordinated implementation across all cruise terminals. With experience gained over the period, the following steps are needed to increase ease of doing business:

1 Process streamlining

- A credit card size e-LC with a barcode to be issued for use at multiple ports
- Collective clearance and the biometric exemption have been granted for three years (w.e.f Jan 2019) in order to enable quick immigration
- E- Landing Card (e-LC) for the crew to reduce paperwork for ships
- Dedicated process for completing the Immigration process enroute from previous foreign ports

2 Personnel Sensitization and Training

- Continuous training to officials across all segments - ports, security, immigration and, customs - to ensure uniform practices across all terminals and departments
- For example, In Mumbai, Port Sensitization training has been institutionalized as a regular practice in cruise and non-cruise seasons

3 Implementation and Monitoring

- SOP implementation committee to monitor implementation of SOP in all ports by all agencies uniformly

Initiative 7.9: Establish three dedicated cruise training academies in partnership with Global Cruise lines to enhance availability of competent talent for cruise ships

The growing Indian cruise industry offer significant opportunities for cruise crew jobs with attractive benefits such as tax-free dollar earnings, on-board perks like food, lodging, medical expenses, etc. Moreover, there is flexibility of assignment with short contracts lasting up to 10 months across multiple designations and posts with different specializations.

Despite the presence of Maritime Training Institutes (MTIs) and hospitality institutes, the training required for the scale of operations on cruise ships, merits the establishment of a world-class training facility in India. Three potential locations have been identified on the basis of home port development and cruise traffic projections, where cruise crew training facilities to be setup in partnership with global cruise lines in India:

1. Goa
2. Kerala
3. West Bengal

Initiative 7.10: Dedicated promotional and marketing campaigns to activate and attract Global Cruise lines and passengers

The global cruise industry is likely to spread out from the current cruising sectors of Caribbean, Mediterranean, China, etc., and find new destinations. India can be a promising alternative, given a long coastline and multiple tourist attractions. Therefore, it is important that India builds its brand as a viable cruising destination and a unique cruise opportunity. India would need to launch sustained promotional and marketing campaigns particularly targeting cruise liners and terminal operators as they play an important role in bringing cruise business to a destination. India would also need to take its promotion and campaigns to international trade shows and relevant conferences. Detailed action steps have been outlined across three levers to drive active participation at international forums and marketing campaigns:

Lever	Key activities to be undertaken
Workshops/ Conferences	• Hosting regional cooperation meets with Indian Ocean Rim Association countries
	• Organize National and International workshops with industry participants to showcase sector improvements and capabilities
	• Participate in international cruise conferences held in various parts of the world like Miami, Dubai, China, Singapore
Tours for cruise lines	• Organize FAM tours for key decision makers of cruise line executives; engaging with them on a one-to-one basis to understand and align the ecosystem
Target based marketing	• Participate in travel/trade shows and showcase India to attract tourists in association with Incredible India and various State tourism boards

Initiative 7.11: Drive five demand enablers identified to generate awareness for cruise sector

Five other interventions have been identified to generate awareness among tourists for cruise sector growth in India:

Marketing Campaigns	• Marketing campaign on the lines of the Incredible India campaign • National cruise marketing and river marketing positions to be assigned within governing body • Marketing and promotion for wedding cruises and incentive cruises • Marketing plan to be prepared for building home ports and attracting global cruise lines
Marketing Partnerships	• Marketing partnerships with cruise-lines and airlines for developing comprehensive offering on lines of Fly and Cruise • Partnerships with corporates
Leave Travel Allowance	• Center has permitted employees to avail concession through rail and air travel under Leave Travel Concession (LTC) scheme. The scheme is proposed to be extended to the cruise sector
Regional connectivity subsidy	• Leverage regional connectivity scheme to develop cruise tourism in under-developed states by charging cruise-lines and State contribution • Dedicated routes to be developed basis detailed demand assessment
Online booking and information	• Development of an online marketplace portal with sector and cruise booking information • Portal to be jointly developed by Ministry of Tourism and Ministry of Ports, Shipping and Waterways in partnership with a private player • Joint ventures with existing online portals like MakeMyTrip, Agoda to be explored

- Extension of leave travel concession benefits to cruising and water transportation to incentivize demand
- Leverage regional connectivity scheme for development of cruise tourism in under-developed states through contribution of cruise-lines and State government
- Develop online marketplace portal for cruise booking and information

7.3 Island and Lighthouse Development

Globally, lighthouses are becoming potential tourist attractions as they provide panoramic views of scenic locations, mostly on the coastline. Lighthouses could become tourist destinations for day tours as a part of port-of-call for international cruises and coastal/island cruises. Essential focus areas for development of lighthouse tourism include:

1. Infrastructure development
2. Provision of entertainment offerings
3. Development of hospitality sector

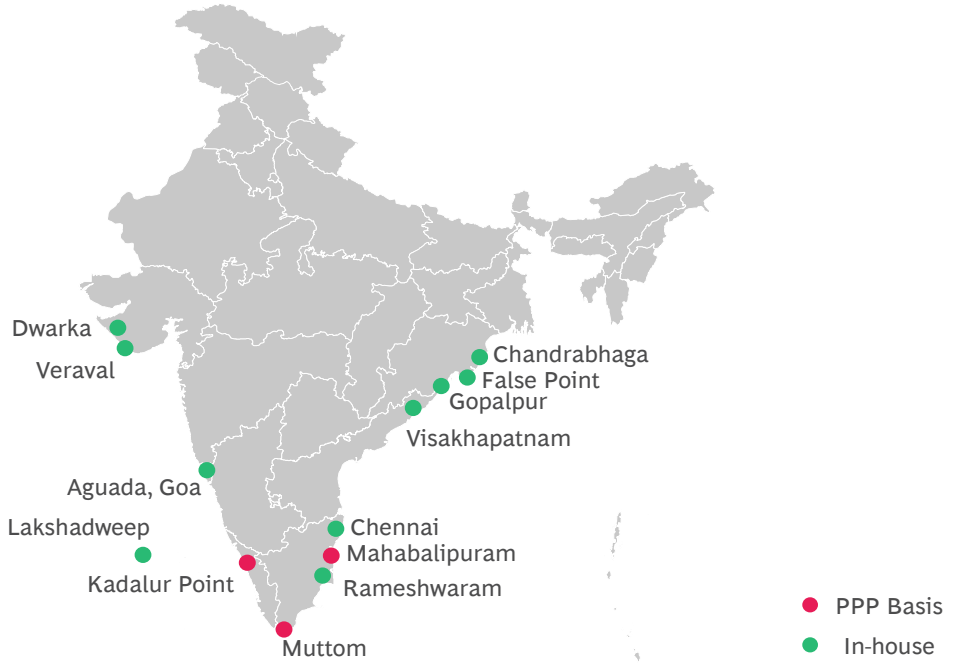
There are 190+ existing lighthouses in India that can be integrated with ocean or coastal cruises to promote lighthouse tourism. Directorate General of Lighthouses and Lightships (DGLL) and MoPSW have undertaken an ambitious project for the development of lighthouse tourism across India to revitalize the existing lighthouse facilities for alternative uses.

Initiative 7.12: Development of 13 lighthouses as day excursion destinations for attracting coastal and ocean cruise passengers

13 potential lighthouses have been prioritized for development as tourism destinations across 2 models (Exhibit 7.9):

1. In-house development
   - 10+ lighthouses identified for improvement of infra facilities, provision of tourism destinations, landscaping, etc.
     - Heritage and Maritime Museum in Chennai
     - Alleppey and Kannur lighthouses in Kerala
     - Gopnath, Veraval and Dwarka lighthouses in Gujarat
     - Vizhinjam, Thangasseri and Vypin lighthouses in Kerala
     - Chandrabhaga lighthouses in Orissa
2. PPP development
   - Three identified PPP projects are planned to be implemented on DFBOT basis
     - Mahabalipuram
     - Muttom Point in Tamil Nadu
     - Kadalur Point

Exhibit 7.9 | 13 lighthouses as tourist destinations across 2 models



Source: Press Search; Directorate of Lighthouses & Lightships

- Mumbai Port Trust has planned to develop Kanhoji Angre lighthouse on EPC basis

Initiative 7.13: Holistic development for island ecosystem across Andaman & Nicobar (A&N) islands and Lakshadweep islands to make them an attractive cruise destination

India's Island Development Agency (IDA) has drawn long-term schemes to develop Andaman & Nicobar (A&N) islands and Lakshadweep islands for tourism. Initially, development plans have been focused on job creation for locals through tourism promotion and export of locally made seafood and coconut-based products. In the first phase, these plans are being implemented in four islands of Andaman & Nicobar and five islands of Lakshadweep. In the second phase, suitable sites in 12 more islands of Andaman & Nicobar and 5 islands in Lakshadweep will be covered. Consequently, Ministry of Ports, Shipping and Waterways to collaborate with IDA for cruise tourism development in these islands:

1 Andaman & Nicobar Islands

- At present Swaraj Dweep and Shaheed Dweep are the two established tourist destinations
- By 2035, approx. 10,000 tourists at Swaraj Dweep and 4,000 tourists at Shaheed Dweep are expected daily in addition to the projected resident population of about 12,000 and 4,300 for these islands respectively under Sagar Tat Yojna, 15+ projects, worth approx. 750 Cr., have been undertaken to promote coastal tourism in A&N islands

2 Lakshadweep Islands

- Most tourists visit Bangaram Island located about 17 km away from Agatti airport
- Approx. 930 Cr. investment projects are being undertaken under the Sagar Tat Yojna to promote coastal tourism in Lakshadweep islands

7.4 River and Inland Cruise

The global River cruise market has grown at ~5% over the last few years and is expected to constitute ~37% of Cruise market by 2027. Europe has been driving growth with approx. 60% share of river cruise vessels in the world. The river of Danube in Europe and Yangtze in China have dominated the river cruise market globally (Information Box 7.1).

Countries across the world have evolved several best practices in their efforts to resolve river cruise tourism issues and these serve as valuable source of knowledge for others.

River cruise in India has significant untapped potential. Currently, only 5 National Waterways (NW) are offering river cruises (Exhibit 7.10):

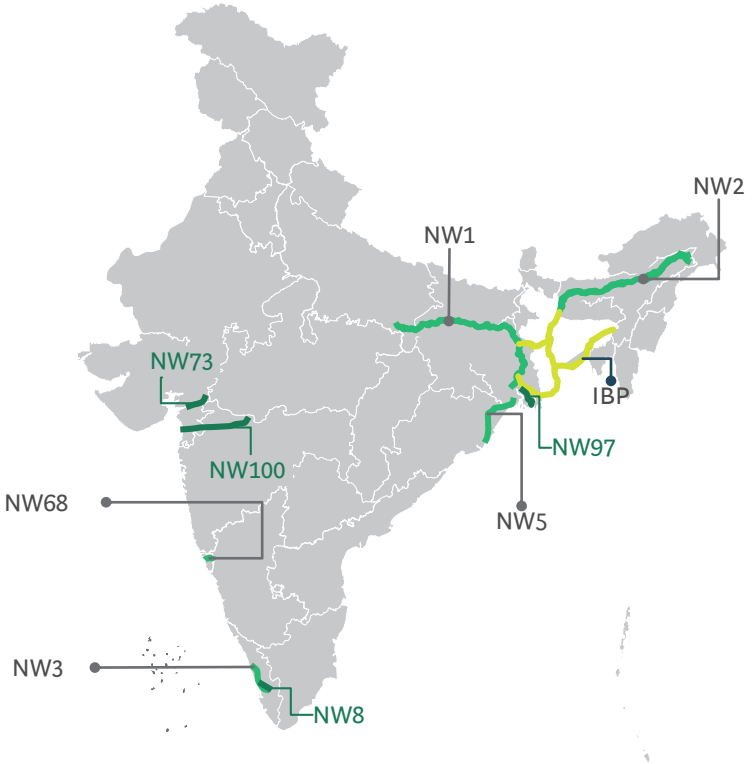
Information Box 7.1

Rhine – Main – Danube (3500 Kms) – leading waterway in river cruise tourism globally

Rhine-Main-Danube occupy 44% of global river cruise market share, with over 350+ vessels and 0.5 million passengers annually. 3000+ cruises are operated annually with Viking River Cruises, Ama Waterways and Phoenix Reisen occupying 30% of European river cruise market share. Most of the cruises are organized in the middle section of the waters i.e., between Germany, Austria, Hungary and Czech. Over 70% of ports along the Danube River cater to cruise tourism, with highest participation coming from Germany and Romania. Multiple themed tours have been established to attract different customer segments as below:

Cultural Micro Niches	Elements of Micro-Niche	Example
Heritage Tourism		
Destination Related	Special points in the city, statues, museums	Atles Rathaus; Old Stone Bridge and Museum Rembrandtplein
Historical and political building	Royal palace, castle, parliament	Hungarian parliament, Belvedere Palace, Burgruine Durnstein
Religious Tourism		
Memorials of religions	Churches, abbey, monastery, shrine	Matthias Church, Stephen's Church
Art Tourism		
Art	Theater, film museums, filming locations	• Museum of Modern Art • Romanian Athenium
Genealogy Tourism		
Ethic, racial reminisces	Holocaust museum, Jewish heritage	Holocaust museum, Tomb of Chatam Sofer

Exhibit 7.10 | Operational and proposed waterways for River Cruise in India



5 Key waterways with operational river cruises

4 additional waterways prioritised for river cruise tourism

1 National Waterway 1: Ganga (Exhibit 7.11)

- Deployment of 13 vessels with annual traffic of 12,000 passengers in FY19
- Key attractions: Ramnagar fort, Kashi Vishwanath temple, Mahavir Jain temple

Exhibit 7.11 | National Waterway 1 - Ganga

2 National Waterway 2: Brahmaputra (Exhibit 7.12)

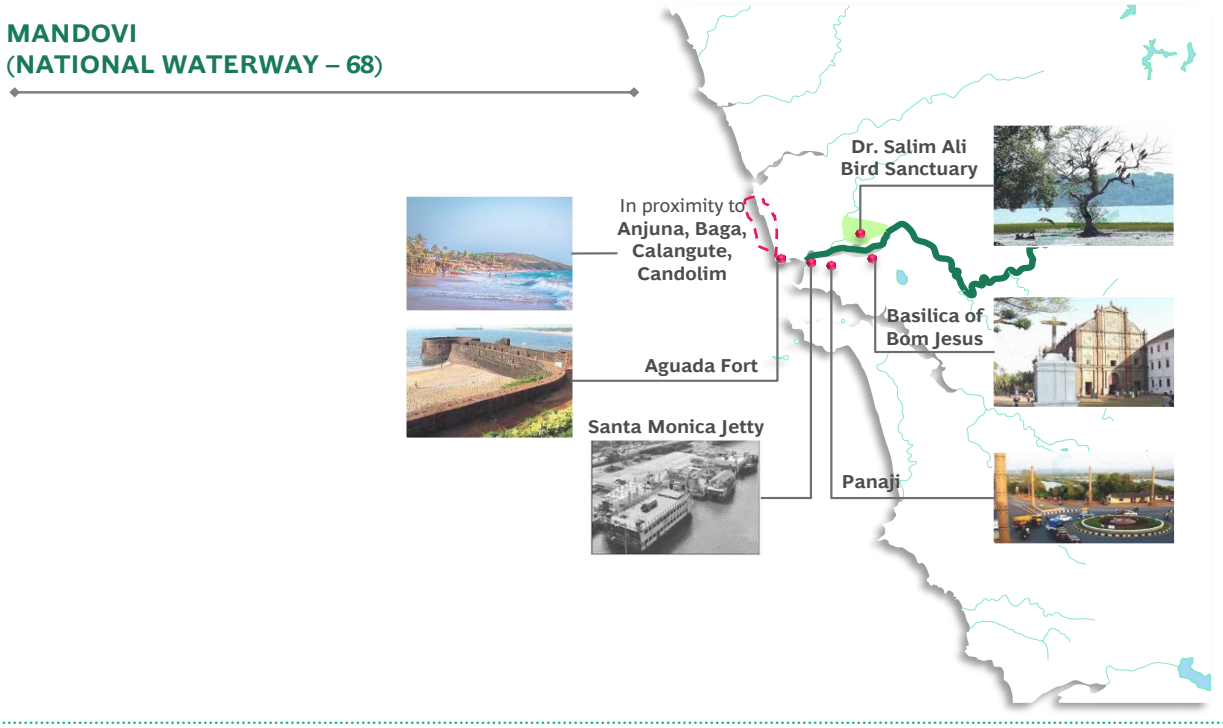
- Deployment of four vessels with annual traffic of 950 passengers in FY19
- Key attractions: Kaziranga National Park, Manas Forest Reserve, tea gardens

Exhibit 7.12 | National Waterway 2 - Brahmaputra

3 National Waterway 68: Mandovi (Exhibit 7.13)

- Key attractions: Dr. Salim Ali Bird Sanctuary, Basilica of Bom Jesus, Santa Monica Jetty, nearby beaches of Anjuna, Baga, Calangute and Candolim

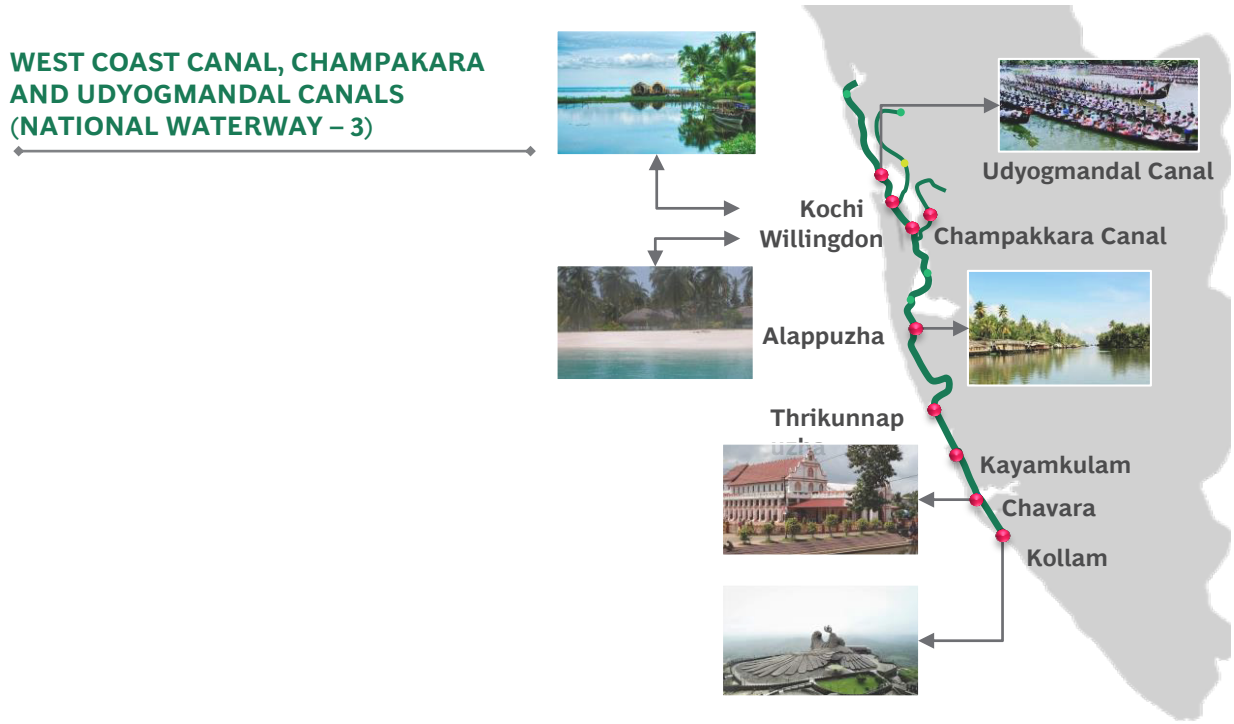
Exhibit 7.13 | National Waterway 68 - Mandovi



4 National Waterway 3: West Coast Canal (Exhibit 7.14)

- Key attractions: Champakara canal, Udyogmandal canal, Kayamkulam, Chavara

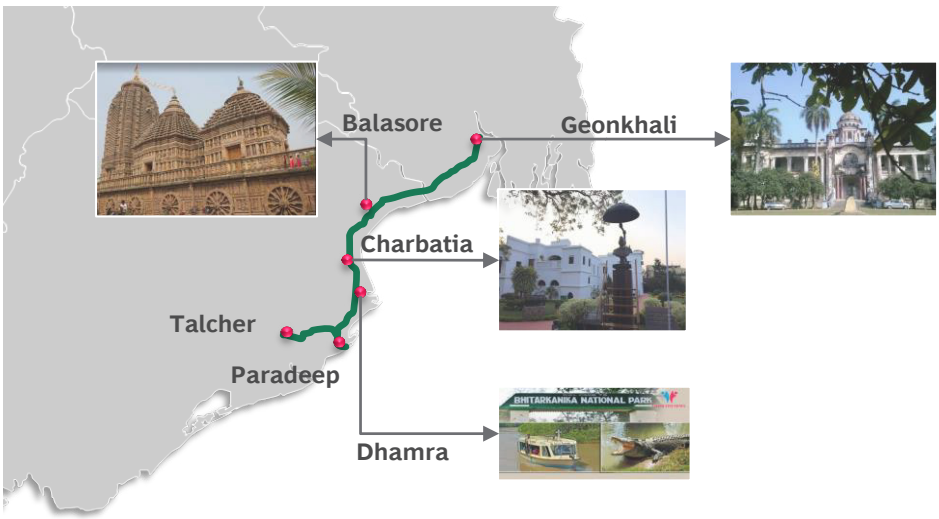
Exhibit 7.14 | National Waterway 3 – West Coast Canal



5 National Waterway 5: East Coast Canal (Exhibit 7.15)

- Key attractions: Geonkhali, Charbatia, Balasore, Dhamra, Paradip

Exhibit 7.15 | National Waterway 5 – East Coast Canal



There are numerous (potential) tourist attractions along the identified major NWs and most of them are navigable. However, there are few challenges that need to be addressed:

1. **Infrastructure:**
   - Limited river terminals resulting in lack of land-sea connectivity
   - Lack of availability and maintenance of navigational depth along the NWs
2. Need for incentives in the initial phase to make the sector viable due to its seasonality
3. Limited availability of suitable vessels at affordable prices
4. Difficulty in obtaining approvals and clearances due to multiplicity of stakeholders

Initiative 7.14: Development of terminal infrastructure and creation of concrete / floating pontoon jetties across NW 1, 2, 89, 8, 73, 100 circuits for cruise operations

Terminal infrastructure and specific circuits must be developed to promote river cruise tourism in partnership with state governments and tourism boards. River cruise options can be developed and bundled based on cruise offerings and time durations as below:

S No.	Category	Issues	Best Practices
Duration	Long Duration Cruise, Multiple nights	Short Duration Cruise, few hours - 1 night	Short Duration Cruise, few hours – 1 night
Length	Length: Above 150 km	Length: 10-150 kms	Length: <150 kms
Attractions	Nature viewing, cultural experience and tourist locations	City tours	Viewing and waterway travel
Proposed NWs	NW 1 (Ganga River) NW 2 (Bhamhaputra River)	NW 100 (Tapi River)	NW 89 (Savitri River) NW 8 (Alaphuzha–Changanassery canal NW 73 (Narmada River)

Initiative 7.15: Infrastructure development to link river cruise tourism with sea bound locations within India (A&N Islands) and outside India (Bangladesh, Myanmar, Thailand)

An enormous potential exists in linking river and sea tourism between inland and coastal cities to provide unique experiences for passengers. Following are the potential domestic and international routes:

- Domestic – Linking inland cities with coastal cities such as Kolkata, Chennai and islands like Andaman and Nicobar Islands
- International – Linking with neighboring countries such as Bangladesh, Myanmar and Thailand

Three key enablers have been identified to establish linkages between river and sea tourism:

1. Availability of Infrastructure: Infrastructure development along riverbanks and seaports, river deepening and multimodal connectivity to enable smooth operations
2. Ease of doing business: Linking multiple stakeholders from river and sea tourism under a single Cruise Action Team
3. Availability of required fleet: Formulation and adherence of rules for specialized vessels and boats eligible on both seas and rivers while maintaining safety standards

Initiative 7.16: Development of a comprehensive River cruise policy with standardized SOPs

A comprehensive river cruise policy that addresses supply and demand constraints needs to be formulated and implemented to facilitate ease of access and improve the sector's appeal. River cruise Policy with standardized SOPs should clearly define responsibilities across multiple stakeholders with implementation guidelines in areas such as mentioned below:

- Anchorage
- Ship clearance
- Safety of operations
- Passenger services
  - ¬ Custom clearance
  - ¬ Tourism facilities
- Separate checklists to be created for each stakeholder
  - ¬ For example, for a port handling cruise vessel, a checklist of pre-arrival and in-port procedures may be issued

Initiative 7.17: Development of canal tourism master plan and comprehensive governance policy for promotion of canal tourism

Canal tourism is already a significant part of Kerala's waterways, with Alappuzha and Vembanad Lake (on NW-3) as established destinations. Identifying tourist destinations along the banks of canals is a high priority. These destinations can then be further developed and marketed to attract tourists. For example, boat tours between Roorkee, Haridwar and Rishikesh on upper Ganga Canal, Indira Gandhi Canal in Thar desert and Buckingham Canal along the Coromandel coast provide immense opportunities for canal tourism development.

This chapter suggests six key recommendations for the growth of canal tourism:

1. State-wise Master Plan to identify the key tourism routes and strategy for marketing and development
2. Comprehensive policy to address supply and demand side constraints
3. A transparent and simple framework for implementing and operating projects and services
4. A Coordinating Body for coordinating and implementing sector plans between public administrations, association, other partners and individuals
5. Development of destinations/tourist attractions/waterfalls/marinas by local authorities in cooperation with State / District level Departments of Tourism
6. Dedicated formal training programs for operators to acquire skills to deliver quality and benchmarked services

Initiative 7.18: Development of water aerodromes for seaplane movement across prioritized 16 locations in partnership with Ministry of Civil Aviation (MoCA)

Sea planes tourism is a highly developed global market with multiple unique tourism and leisure opportunities. The market is primarily dominated by USA and Canada (over 80% of the global market). (Information Box 7.2)

India, with 111 waterways and 200+ ports, offers a significant market for expanding Sea planes tourism and transportation. 16 locations have been prioritized for Water Aerodromes development in partnership with MoCA under the Udaan scheme 4.0 (Exhibit 7.16)

Information box 7.2

Canada leverages seaplanes across three key purposes:

City tourism

Provide panoramic view of a coastal cities such as Vancouver

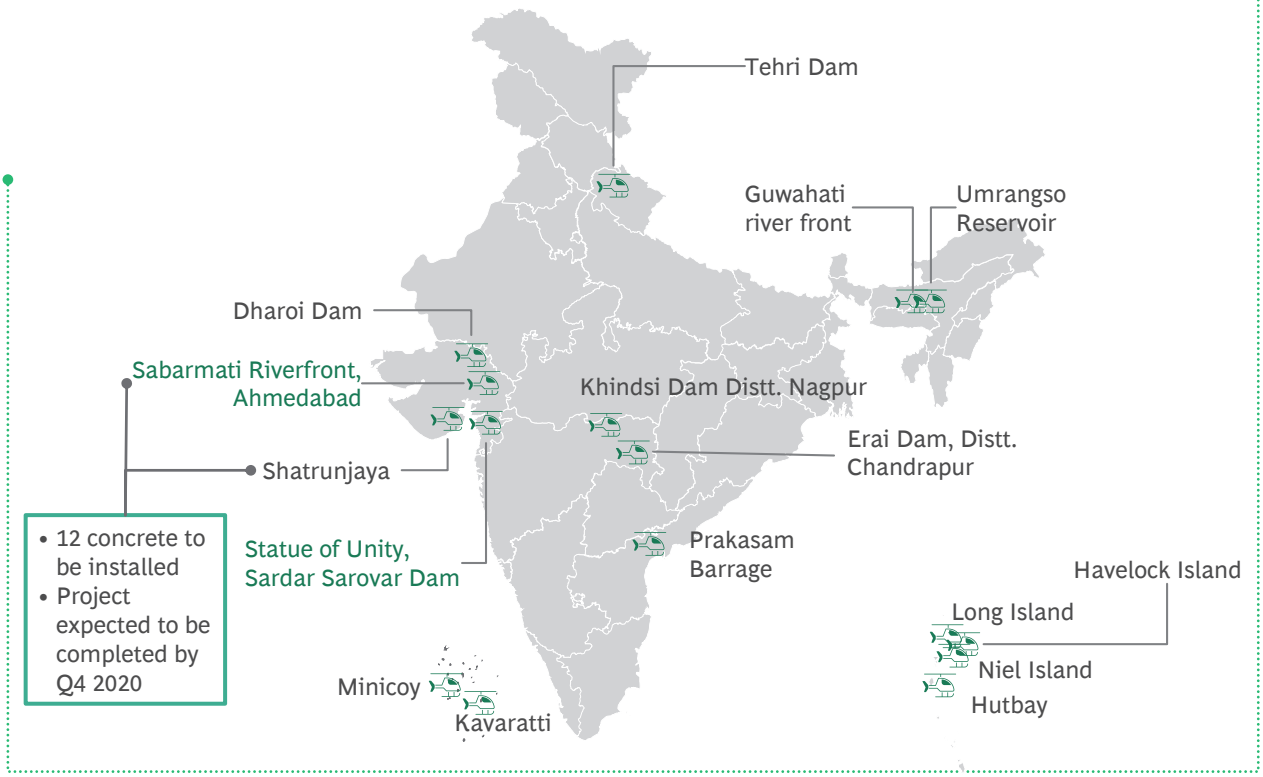
Island tourism

View and transport to gulf islands and archipelagos

Coastal tourism

Tour and transfer to 177 km Sechelt coast inaccessible by road

Exhibit 7.16 | Potential locations for Sea Plane tourism



7.5 Conclusion and summary

Indian Cruise sector has the potential to grow by 8X over the next decade owing to rising demand and disposable incomes. Development of the cruise sector will also lead to significant regional development and economic growth. This chapter has identified 18 initiatives across three focus areas to enhance India's cruise tourism ecosystem, potential creation of 2,00,000+ new jobs, meet the expectations of cruise visitors and cruise line industry, and provide momentum for infrastructure development:

1 Ocean and coastal cruise

- Development of five theme-based coastal and island circuits across pilgrimage, ayurvedic and heritage themes
- Development/ enhancement of Cruise Terminal infrastructure at 12 ports
- Establishing three dedicated cruise training academies in Goa, Kerala and West Bengal in partnership with global cruiselines

2 Island and lighthouse development

- Holistic development of island infrastructure and ecosystem across Andaman and Lakshadweep regions to turn them into attractive cruise destinations

3 Inland or River cruise

- Drive synergies across Central & State Govt. for development of inland waterways
- Development of community jetties to boost growth: Arth Ganga model
- Operationalization of 60+ ferry terminals across National Waterways (NWs) and coastline with Stat governments
- Development of river cruise terminal infrastructure along 10+ prioritized circuits on 6 NWs

This chapter has also identified key targets that need to be met to enable India to become a global hub for cruise tourism by 2030 (Exhibit 7.17).

Exhibit 7.17 | Key Targets for Cruise Tourism Development

KPI metric	Current	Target[1] (2030)
Number of cruise passengers	4,68,000	>15,00,000
Number of ship calls made (Home + port call)	451	1,000
Number of global cruise-lines with "Home Port" in India	1	6
Operational waterways for river cruise movement	6	>10
Number of cruise training academies in partnership with cruise-lines	-	3

Source: Bermello & Ajamil Partner report, TA 6 group discussions

CHAPTER 8

Enhance India's Global Stature & Maritime Cooperation

Enhance India's Global Stature & Maritime Cooperation

8.1 Introduction

Shipping sector is a global business with regulations driven by International Maritime Organization (IMO). India, as of 2020, has 1400+ registered vessels with around 12.7 Mn Gross Tonnage. In addition, India has a large number of inland and near-coastal vessels. For a country with vast stake in global maritime sector, India should continue to have substantial involvement and strong influence at the IMO.

While India has chaired several committees in IMO such as committee for Human Element, Training and Watch-keeping (HTW), Executive Committee of the International Oil Pollution Compensation Funds (IOPC) Funds, etc., further strengthening of India's influence and promotion of Indian interests at IMO is required through enhancement of global visibility and collaboration with other maritime countries. India needs to explore and build partnerships with Indian Ocean Rim and Bay of Bengal Initiative for multi-Sectoral Technical and Economic Cooperation (BIMSTEC) nations.

India's trade with the BIMSTEC nations has grown at annual rate of 10.4%, while the geographical proximity and maritime connectivity offer a even higher potential for collaboration. To bolster global stature, India being the largest economy amongst the BIMSTEC nations needs to take up the leadership role for maritime coordination and cooperation. Efforts are also being undertaken to develop and strengthen connectivity (ferry, cruise, cargo) with neighboring countries such as Bangladesh, Sri Lanka, Maldives.

In order to enhance India's Global Stature & Maritime Cooperation under MIV 2030, interventions are required in three key areas:

1. **Enhancing maritime co-operation across BIMSTEC nations** – Enabling India to play major role in development of Maritime trade between BIMSTEC countries (e.g. capability development, mutual agreements, etc.)
2. **Collaboration with other maritime nations** – Expanding cruise / ferry connectivity and driving tie-ups / MoUs across topics with various countries to enhance maritime co-operation
3. **Enhancing India's representation in IMO** – Strengthening permanent representation at IMO to enhance and garner maritime expertise for India
4. **Capability development** – Promoting "Resolve in India" and imbibing confidence in international players for International maritime dispute resolution

8.2 Maritime co-operation across BIMSTEC nations

BIMSTEC is a regional organization comprising seven member nations in the Bay of Bengal (BoB) region. It constitutes seven members: five deriving from South Asia, including Bangladesh, Bhutan, India, Nepal, Sri Lanka, and two from Southeast Asia, including Myanmar and Thailand (Exhibit 8.1).

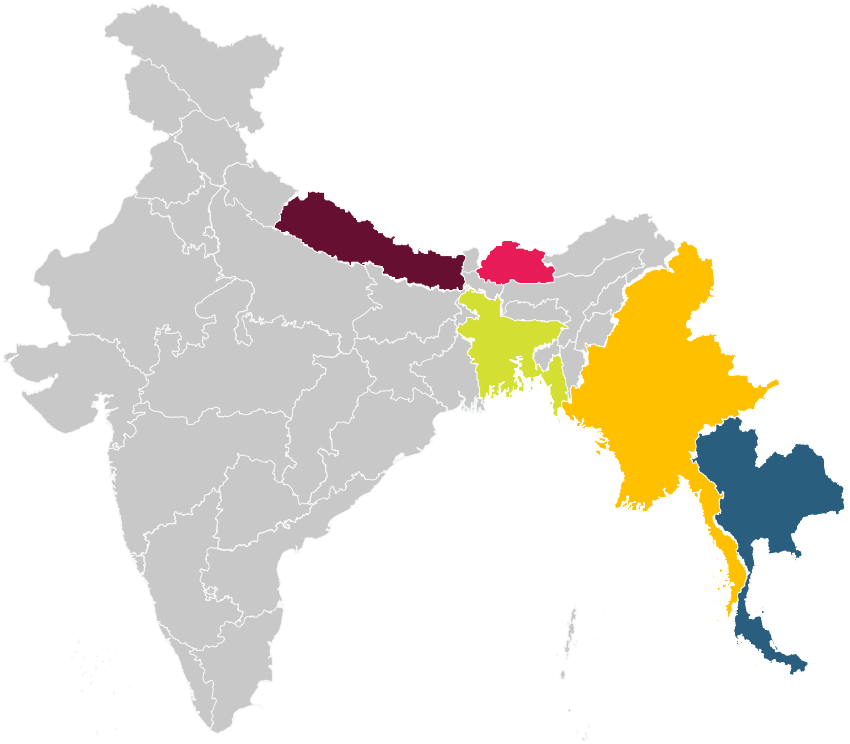
The BoB, bordered by India on Western side, Thailand on East side, and with Bangladesh, Myanmar & Sri Lanka in between, hosts a huge population and is passed by some of the world's most important trading routes. It is likely to gain much greater prominence with adjacent countries such as Bangladesh, Sri Lanka and Myanmar experiencing high growth rates in coming years. India needs to enhance its cooperation with BIMSTEC nations to gain strategic importance and gain trade benefits. Thrust area discussions have outlined key objectives for BIMSTEC co-operation:

- India to play major role in development of Maritime trade between BIMSTEC countries
- India to help landlocked BIMSTEC nations by providing access and reducing the alienation of Nepal and Bhutan
- Introduce regular and scheduled feeders in BoB for BIMSTEC trade
- India to establish common standards for data exchange and customs in line with European Union
- Provide opportunities for training seafarers of BIMSTEC nations on subsidized basis

5 key initiatives have been identified for enhancing relationships with BIMSTEC nations as below:

India	Transport and communication, Tourism, counter terrorism, Environment and disaster management
Myanmar	Energy
Thailand	Public health, connectivity
Sri Lanka	Science and technology, human resource development
Bangladesh	Trade, investment and development
Nepal	Culture and media
Bhutan	Environment and climate change

Exhibit 8.1 | BIMSTEC member nations



Initiative 8.1: Setting up of a regional BIMSTEC centre in India

Currently, each BIMSTEC member lead an area of partnership as below:

India to set up a regional BIMSTEC centre to enhance cooperation and strengthen influence among members nations as follows:

- Coordinate with BIMSTEC organization and with different ministries MoPSW, MEA, MOF, Trade and commerce, Tourism etc.
- Focus on issues and development of maritime activities in BIMSTEC region specifically
- Common digital platform for BIMSTEC to provide information on trade, shipping lines, ports, Maritime institutes, trade shows, MoUs etc.
- Centre to act as a promotion house to collaborate with foreign powers such as Japan, Aus., EU, etc.
- Engage with trade associations/ councils focusing on promotion of trade in BIMSTEC region – India-BIMSTEC promotion council by The Associated Chambers of Commerce of India (ASSOCHAM)

Initiative 8.2: Enhance investment in infrastructure development to improve regional connectivity and facilitate trade

Five key interventions have been identified to enhance investment in infrastructure development:

- Development of inter-modal connectivity like roads, rail at Ports in India and BIMSTEC
  - ¬ Critical to provide multi-modal projects to link ports to hinterland, including Bhutan, NE India and Nepal
- Development of ICDs and opening private rail participation to serve Nepal trade from Port of Kolkata
- Assistance in development of dry ports/ ICDs in landlocked nations Nepal and Bhutan
- Improving Inland waterways to facilitate trade to Bangladesh, Bhutan and Nepal
  - ¬ River connectivity on Indo-Bangladesh Protocol (IBP) route to reduce cost and time of cargo from India to Bangladesh
  - ¬ Address key issues in IWT – ensuring water depth, real time dissemination of information, smooth and easy cargo clearance, Custom SOP and border check-posts
- Exploring direct sailings from Indian ports
  - ¬ India to Yangon (Myanmar) connectivity to avoid transshipment through Port klang
  - ¬ Direct services to Thailand and key ports across Bay of Bengal

Initiative 8.3: Finalize mutual agreements to facilitate intra-BIMSTEC trade

Four key agreements have been identified to facilitate intra-BIMSTEC trade:

- BIMSTEC coastal shipping agreement
- BIMSTEC master plan on transport connectivity
- BIMSTEC community of interests to harness comparative advantages of all BIMSTEC ports
- Promotion of indigenous shipping industry and associated infrastructure

Initiative 8.4: Develop capabilities across BIMSTEC nations

Three key areas have been identified for cooperation on Maritime training and skill development in BIMSTEC region:

- Attract BIMSTEC talent and promote skill development through maritime universities
- Increase interaction between Indian and BIMSTEC ports for adoption of best port practices, intermodal connectivity, SOPs etc.
- Develop SOPs for seamless crew exchange at BIMSTEC ports

Initiative 8.5: Implement other identified action items such as common standards, facilitation of trade through collaboration of shipping lines etc.

India to undertake following additional steps to facilitate trade among BIMSTEC nations:

- Follow the EU model to establish common standards for data exchange and customs
- Collaboration of Indian shipping lines with import and export firms of BIMSTEC nations for transport of cargo
- Potential set-up of a commercial venture, joint stock BIMSTEC shipping company to focus on shipping opportunities in BIMSTEC region

8.3 Collaboration with other maritime nations

India has been collaborating with various countries to enhance Maritime co-operation in last few years. Focused outreach programs to im-

mediate neighbors have been underway such as SOP development on the use of Chattogram and Mongla ports, direct cargo services to Myanmar, etc. A feasibility study is already planned for Eastern Maritime Corridor between Indian Ports on East Coast and ports in Far East Russia. In addition, there is an on-going engagement with European Commission for attracting ships flagged in member EU states to the shipbreaking yard at Alang, Gujarat. Several other Joint Maritime Commissions are being pursued for cooperation in shipping and port sectors (Exhibit 8.2).

Initiative 8.6: Develop additional cruise, ferry and cargo connectivity routes to neighboring countries to establish maritime leadership position

Multiple opportunities exist for circuit expansion across neighboring countries such as:

1. Coastal cruise across India, Sri Lanka, Bangladesh & Thailand: Leveraging island and coastal cruise opportunity across Indian coastline and neighboring countries
2. River cruise for Bangladesh: Develop river cruise opportunity linking West Bengal and Bangladesh
3. Ferry services for Sri Lanka: Ferry services to adjoining locations like Jafna to promote tourism & economic ties
4. Ferry and cargo services for Maldives:

Promoting tourism and EXIM trade thorough following steps:

- Engaging in a new luxury cruise line offering tourists a unique experience by offering add-ons like activities, in house entertainment, rejuvenation facilities, etc.
- Creation of a new direct shipping line calling at Cochin-V.O.Chidambaranar-Maldives-Cochin with a round voyage of 14-16 days
- Target cargo to include perishables, food, construction material, salt, bulk, steel, sand, pipes, etc.
- Key Central Govt. interventions required –
  i. Providing funds for establishing cruise hubs and terminal infrastructure
  ii. Subsidizing cost of operations (port charges etc.)
  iii. Providing a viability gap funding for initial period of 2-3 years

MoPSW to adopt a 2-phased approach as below:

Phase-1: Development of cruise, ferry and cargo connectivity with Sri Lanka, Maldives and Bangladesh

Phase-2: Development of long-distance cruise and connectivity with potential countries such as Indonesia and Myanmar

Exhibit 8.2 | India's MoU with other countries to enhance Maritime co-operation

Country	Details of MoU
Myanmar	• Creation of Industrial Centres in Myanmar • Facilitate cooperation between Oil and Gas companies for development of petroleum products
Indonesia	• Blue Economy, Maritime security and Maritime Safety
Germany	• Cooperation in Inland, Coastal and Maritime Technology
Denmark	• Shipping dialogue, quality shipping and cooperation on port state control • Maritime training, education, research and development • Green Maritime technology and shipbuilding
Norway	• Development of a task force on blue economy for sustainable development
Australia	• Cooperation in the Indo-pacific region, IOR association, Indian Ocean Naval Symposium, Indian ocean Tuna commission and Indo-Pacific Oceans initiative • Supply of high-quality mineral resources to India • Marine Pollution and climate change

Initiative 8.7: Extend partnerships with 9 leading maritime nations across 5 areas to develop domestic capabilities (e.g. maritime law, port logistics etc.)

Five domains have been identified for potential MoU partnerships to leverage expertise and enhance India's capabilities as:

- Ship operations and Management
- Port logistics
- Maritime finance
- Maritime Law
- Technology

As shown in Exhibit 8.3, India to devise country-wise and port-wise collaboration strategies across 5 domains with 9 leading maritime nations in phases as below:

Phase 1: Develop collaborations with Norway, Hong Kong, Singapore, United Kingdom and USA across the domains of Maritime Law, Maritime Finance and Technology

Phase 2: Develop collaborations with South Korea, Singapore, Japan and Netherlands across the domains of Ship operations and Port logistics

Initiative 8.8: Offer India's core expertise to developing countries across three domains (Technology Assistance, Infrastructure Assistance, Capability development assistance)

India's development assistance covers a large number of countries, resulting in an increase of projects undertaken by the MEA. Significant potential exists to widen the role of MEA to promote India's maritime capabilities across partnering nations. MoPSW to engage with MEA to utilize benefits of existing agreements / MoUs and leverage MEA's assistance for defining key strategic elements as:

- Countries to target for maritime projects
- Potential domains / sub-sectors useful for the receiving / partnering countries
- Financing plan for technology sharing

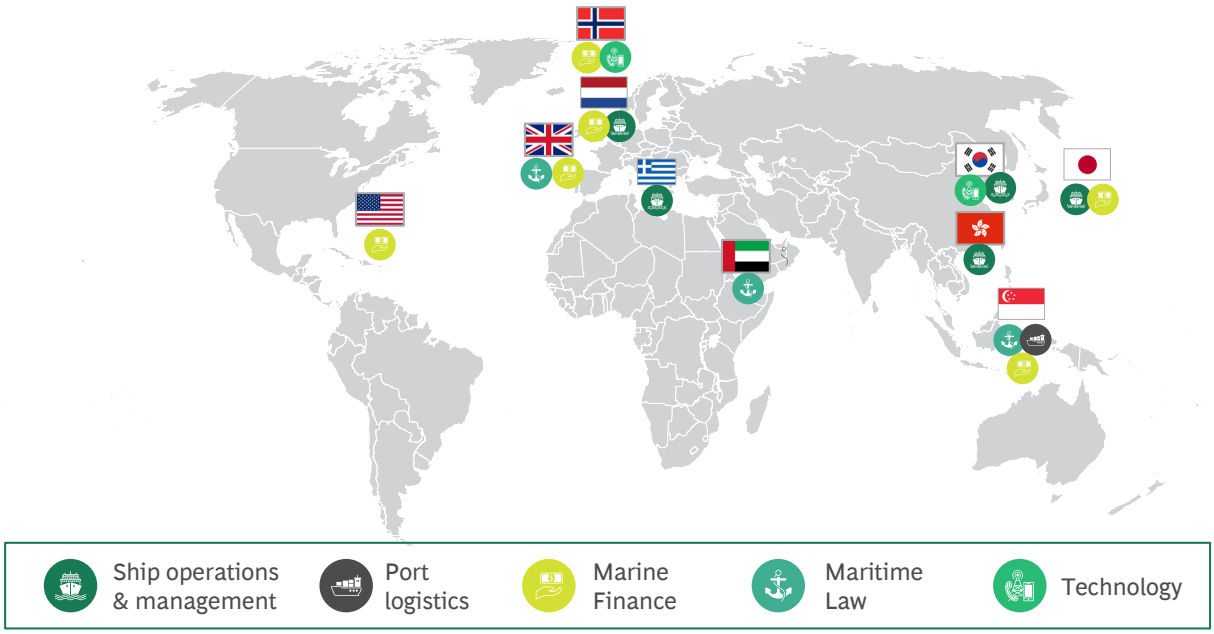
India's core expertise to be offered to other countries for collaboration across technological assistance, infrastructure assistance and capability development areas as below:

Technological assistance	India's current capabilities	Actions to create global maritime partners
1 Develop software and technology platforms for Maritime community	• High IT capability to develop software and technology systems for global maritime community	• Implement systems like terminal ops, navigational and signaling system for wider maritime industry • Shipping industry to collaborate with NTCPWC to develop an IT lab focusing on technology platforms for Maritime industry
2 Naval architecture & shipbuilding/ship repair	• High number of premier universities like IITs • A high number of shipyards can potentially offer hands on experience	• Leverage High commission in different countries to exhibit courses and infrastructure to attract global talent
3 Ocean Engineering and Hydrography	• IIT offer world class courses in Ocean engineering • National Institute of hydrography, Goa is considered a hub in SEA and Africa	• Leverage High commission in different countries to exhibit courses and infrastructure to attract global talent
4 Long range identification and tracking system	• DGS collaborated with ISRO to develop an LRIT solution with CMC and Tata communications	• Extend LRIT services to neighboring countries and developing countries who do not have this capability

Infra assistance	India's current capabilities	Actions to create global maritime partners
5 Port Management, port designs & institutes in collaboration with Business houses	• With the entry of private players, Indian ports have reached world class level	• Offer advisory services to developing countries on port development and management • Set up institutes with the collaboration of business houses to offer courses in port management, port design, etc.
6 Ship building, ship repair and ship recycling	• Worlds largest ship recycling cluster in Alang, Gujarat • High capabilities in IT and engineering in Maritime activities	• Seek out global giants for M&A opportunities in SE and African nations • Create and expand center of excellence in maritime and ship building
7 Dredging	• Indian dredging companies specialize in maintenance dredging • Many private port operators have their own fleet of dredgers at a world class level	• Explore huge potential of new SEA and African dredging markets

Capability development	India's current capabilities in niche areas	Actions to create global maritime partners
8 Maritime Law	• Highly competitive law universities • 8-10 Law universities offer courses in Maritime Law	• Expand participation by drafting maritime and admiralty statutes, rules and regulations • Participate in committees and other UN bodies for development and unification of maritime and mercantile law
9 Seafarers	• India provide 10-12% of the global seafarers • DGS has started issuing Indian CDC and seafarers identity document for candidates who have completed basic training since 2018 mobilizing seafarers to pursue Indian CDC	• Utilize current institutes for the training of seafarers from developing countries

Exhibit 8.3 | Partnerships with leading maritime nations / ports



Initiative 8.9: Operationalize Chabahar port to drive geo-strategic advantages and establish International North-South Transport Corridor (INSTC) for cargo facilitation from CIS Countries

Chabahar port is located at a very strategic location, connecting India to Afghanistan and central Asian countries, with the potential of being the largest trade hub in Asia. With an agreement between India and Iran executed in 2016, India has taken a lead role towards development of Chabahar port. India has invested approx. USD 85 million in development and operationalization of 2 terminals in Phase 1 for 10 years. However, there are four critical bottlenecks for the development of port as below:

- USA sanctions on Iran have detrimental effect on the following areas for Chabahar port:
  - Procurement of equipment
  - Unavailability of credit facilities
  - No mainline vessels calling at Iranian ports
  - P&I insurance and transit cargo cover
  - Banking challenges
- Unpredictability of vessel calls making limited calls at the port
- No rail connectivity to Chabahar port
- Limited volumes of cargo with high cost

India must formulate both short and long-term plans to operationalize Chabahar port and develop similar footholds in other strategic regional countries. 5 short-term action steps to be undertaken for making Chabahar port operational are as follows:

1. Early activation of 10-year agreement and resolve the dispute resolution clause
2. MEA and Indraprastha Gas Limited (IPGL) to resolve banking difficulties of trade by negotiating with the US treasury and The Office of Foreign Assets Control (OAFC)
3. Expansion of regular marketing events to promote the port
4. Generate return cargo for competitive port operations through incentives/export promotion by Iranian govt.
5. Ministry of Commerce (MoC) to push for Chabahar to be included in the INSTC

Following long-term actions have also been identified for sustainability of Chabahar port and development of similar footholds in other regional countries:

1. Expand on current activities at Chabahar port to include warehousing and transportation to become multi-modal operator
2. Extend current 10-year agreement for another 30 years

3. Development of Sabang port in Indonesia
4. Develop East Coast terminal at Colombo in collaboration with Japan
5. Continue to play a pivotal role in the region and other various trade corridors

8.4 Enhancing India's representation in IMO

India should continue to have substantial involvement and influence at the IMO. To achieve this, India needs to bridge the gap between the functioning of the Indian Maritime Administration and the priorities of the IMO.

Initiative 8.10: Appoint permanent representative at IMO London to enhance India's representation at IMO

With a view to enhance and garner maritime expertise for India, it is proposed that India should nominate at least 2 qualified candidates for the Junior Professional Officer (JPO) Program at the IMO.

The JPO Program is an established program within United Nations with the main objective of providing young professionals an opportunity to gain hands-on experience in international cooperation under the supervision of specialists and to contribute to the advancement of their nation's mandate.

India's participation and involvement in the JPO Program will help to garner expertise in the maritime sector and consequently support in achieving vision 2030 objectives globally.

8.5 Capability development

For maritime industry, insurance covers a number of areas such as ports, vessels, shipbuilding & repair yards, etc. Marine insurance deals with risk and exposure that is domestic as well as international in nature, covers wet properties, wreckage and also huge liabilities. Current Marine Insurance market is at a nascent stage with insignificant premiums in India. Marine insurance (Cargo and Hull) accounted for only ~2% market share in India in FY18 (under non-life segment). While Marine hull premiums have shifted from foreign to Indian underwriters by approx. 33% in last 2 years, growth in Marine cargo premiums has not picked up significantly. Indian marine insurance process currently lacks an integrated approach and excessively depends on intermediaries.

With the growth of trade and tonnage envisaged, it is imperative that India not only has marine insurance / reinsurance capacity for its own increasing needs but also be able to provide this service to other countries to gradually become a global leader. There is significant potential to improve expertise in maritime law and utilization of insurance provisions in international cargo movement.

In addition to this, India currently has limited maritime dispute resolution capability vis-a-vis global centers such as London Maritime Arbitrators Association (LMAA), Singapore International Arbitration Centre (SIAC), Tokyo Maritime Arbitration Commission (TOMAC), etc. With increasing focus to develop India as a global maritime nation, it is essential to work towards establishing an international maritime dispute resolution centre and capture a share of the international maritime arbitration activity, especially when one or both the parties are Indians. There is significant opportunity for Indian arbitrators to grow in international arbitration going forward.

Initiative 8.11: Increase India's insurance capacity for maritime sector to reduce dependence of foreign markets

Four key intervention areas have been identified to enhance India's Marine Insurance capacity (Exhibit 8.4).

Initiative 8.12: Set-up Maritime Arbitration body for International maritime dispute resolution

Key success factors to promote "Resolve in India" and imbibe confidence in international players are as follows:

- Independent, industry governed, and merit-based institutional arbitration system
- Cost effectiveness and resolution efficiency of the system
- Transparent and fair procedural rules ably supported by legal system
- Availability of best-in-class arbitrators and mediators

India can evaluate to setup an Indian Maritime Arbitration Association (IMAA) and define arbitration procedures in compliance with recommendations in amended Arbitration and Conciliation Act 2015 to make arbitration process user friendly, cost effective and time efficient for all parties. LMAA guidelines should be adopted with relevant changes to support local procedures while ensuring standard process for international players.

Exhibit 8.4 | Key interventions to increase India's insurance capacity

	Intervention area	Detailed action items
1	Risk evaluation	• Substantiate the base exposure common to all ports and quantify specific risks for individual ports to establish additional insurance capacity required by India • Assess and modify existing systems to drive cost effectiveness, transparency, and risk exposure optimization (including need to obtain cover from overseas underwriters and reinsurers) • Establish the residual risk resting with ports and evaluate possibility of applying co-assured or jointly assured insurance to reduce liability and recovery under subrogation from ports • Evaluate and prepare for "Force Majeure risks" such as natural calamities, fire or other disruptions in operations, etc.
2	Claims status evaluation	• Audit and recommend improvements in current processes followed at each port like risk valuation, inspections, etc. to reduce the perception of risk and hence premium for customer • Assess current claims pipeline to identify and close cases with unjustified claims or high probability of rejection
3	Implement gold standards basis global best practices	• Benchmark global best practices and establish an end-to-end "Gold Standard" insurance procedure along with a schedule of regular internal and independent external audits • Deploy best-in-class systems to ensure speedy response and legitimate claim disbursements by insurer, thus providing stability to trade and commerce in India
4	Streamline and grow Indian maritime and port insurance capacity	• PSU Ports Management, under IPA, to form a code of practices such as: - Asset registration and annual / biannual valuation - Evaluation of "Business Interruption" exposure by maintaining account books - Maintenance of movable / immovable assets and claims records • Establish Primary insurance pool to maximize market retention led by New India Insurance and including United India Insurance, Oriental India Insurance, General Insurance Corporation, and private sector companies e.g. Tata AIG, HDFC, etc. • Primary insurance pool to be managed by an operational team including executives with required expertise, experienced international brokers, and reinsurers • Appoint a Stakeholder's advisory board to ensure compliance by the insurance pool - comprising of representatives from both PSUs and private underwriters as well as significant clients

IMAA need to ensure autonomy of parties and incorporate their wishes such as contract, arbitration rules, seat of arbitration, etc. Following action steps to be undertaken for driving industry recognition of IMAA and motivating parties to include IMAA dispute resolution clause in contracts:

- Like LMAA & TOMAC, IMAA to be structured as an independent governing body with no compulsory appointment from Government or PSUs
- Include existing segment specific panels (e.g. SAROD-Ports) under IMAA umbrella to serve parties desiring to base their dispute resolution clause upon them
- Establish panel of experienced professionals (with experience in commercial or technical shipping) as Maritime Arbitrators
- Ensuring support from policy makers to make the IMAA clause compulsory in maritime related contracts for PSUs
- Finalization of awards by courts and applications for interim measures
- Enforcement of awards made by IMAA Arbitrators to instill confidence in the institution
- IMAA to provide additional services e.g. Mediation, Arb-Med-Arb, Med-Arb, Arb-Med

8.6 Conclusion and Summary

As part of Vision 2030, key targets have been defined to enhance India's Global Stature & Maritime Cooperation (Exhibit 8.5). India needs to develop maritime trade among BIMSTEC nations and tie-ups / MoUs with other maritime countries. Also, India's representation to be augmented by strengthening sub-committee research for inputs and appointment of permanent representative at the IMO. Furthermore, India to promote "Resolve in India" and imbibe confidence in international players for International Maritime dispute resolution.

Exhibit 8.5 | KPI targets and impact

Metric	Targets (2030)
1 **# of MoUs and active on-ground collaboration with leading maritime nations** regarding Maritime law, finance, ship operations & technology	**>10 (2025)**
2 **Strengthened Collaboration with BIMSTEC nations** including Creation of Maritime BIMSTEC Centre, Development of intermodal connectivity & assistance in development of ICDs/ ports	**Leader for trade & transportation across region**
3 India's position as leading **'Maritime Insurance Provider Globally'**	**Top 10**

CHAPTER 9

Lead the World in Safe, Sustainable & Green Maritime Sector

Lead the World in Safe, Sustainable & Green Maritime Sector

9.1 Introduction

Port authorities and operators face a number of challenges with respect to the role and impact of ports in sustainable development of coastal areas. The development and adoption of internationally benchmarked HSE standards by the maritime sector globally has emphasized that an effective management system must not only encompass operational activities, but also establish safety, health, and environmental objectives and procedures into each process. To achieve sustainability of port operations, authorities and stakeholders should be able to:

a. Manage the port's growth and development effectively
b. Ensure safety and promote the health and welfare of workers
c. Adhere to globally recognized environmental quality standards.

With economic factors driving the need for port operators to maximize revenues, it is necessary that ports optimize all available water, air, land and soil and societal space to the best of their ability.

To do so systematically, maritime operations have to establish a system of governance that specifically addresses these concerns and is designed by taking into consideration the nature of Maritime Operations in India.

With increasing reliance on the coastal and international shipping for trade and commerce, India, has a large maritime sector to address. Its coastal areas have a rich biodiversity both on land and under the sea, and include estuaries, lagoons, mangroves, backwaters, salt marshes, rocky coasts, sandy beaches and coral reefs. These diverse coastal ecosystems, however, are exposed to increasing pressures. Indian Maritime Sector, specifically the Indian ports are obligated entities under Renewable Purchase Obligations (RPOs) and hence, need to actively focus on renewable power. Moreover, Indian Ports need to be in adherence with International Marine Organization's alignment to 9 UN SDG which includes obligations on safe, efficient and sustainable ports. It is therefore now critical that the ports in India have a well-defined road map towards becoming a Safe, Sustainable & Green sector.

Indian ports and maritime bodies need to focus on key environment, safety and health areas such as:

- Increasing Renewable Energy usage at ports
- Improving Air quality at ports
- Optimizing water usage and increasing green cover
- Improving solid waste management
- Dredging material recycling
- Zero accidents, injuries or health hazards at ports
- Centralized monitoring of KPIs and compliance to global standards

9.2 Renewable Energy Adoption at Ports

9.2.1 Solar and Wind Energy

There are many sources of alternative energy some of which are commercially viable, and some are still evolving to be economical and competitive. While Indian ports have installed some Solar and wind energy farms (0.3-6% power share of RE across ports), there is a need to expand the usage consistently.

India as of 2020 is one of the lowest-cost producers for solar PV worldwide with cost of generation being less than ₹3 / unit for utility scale PV. Thus, Solar power today is cheaper than coal generated power (Rs 3.5 per unit) and cost is expected to further fall as low as ₹1.9/unit by 2030[1]

Major Ports currently have approx. ~118 MW generation capacity[2] through Solar PV, with both Rooftop PV and Floating PV gaining commercial acceptance at ports (Exhibit 9.1). Cochin port trust, for example, has commissioned 250 MW of rooftop and floating PV mode[3]. Average life of solar panels are 20-25 years of reliable power output during the day, which allows ports to do long-term planning around solar PV resources.

1 https://energy.economictimes.indiatimes.com/news/renewable/solar-power-cost-will-fall-to-rs-1-9-perunit-in-india-by-2030-teri-study/67972162
2 Discussions with Major Ports, as of July 2020

Solar will continue to be a big part of the energy ecosystem for ports in 2030 as well, with falling prices and ease of construction being a big factor in its continued deployment.

Wind power is also evolving rapidly in India and can be installed at the breakwater and along the periphery of the port premises for energy generation. With national targets determined by the Ministry of Renewable Energy (5,000 megawatts of offshore wind by 2022, and 30,000 megawatts by 2030), ports would be optimum location for this endeavour.

Three Major Ports – Deendayal, VO Chidambaranar Port and Kamarajar Ports – have recently signed deals for wind energy[4]. However, there is further potential to install wind farms in fallow land near / in port area, shallow waters and also along breakwaters.

Initiative 9.1: Increase share of renewable energy to >60% across Major Ports

1 Solar Energy:

Ports need to assess land, rooftop and calm waters availability to install solar panels. There are two ways to develop captive solar power assets

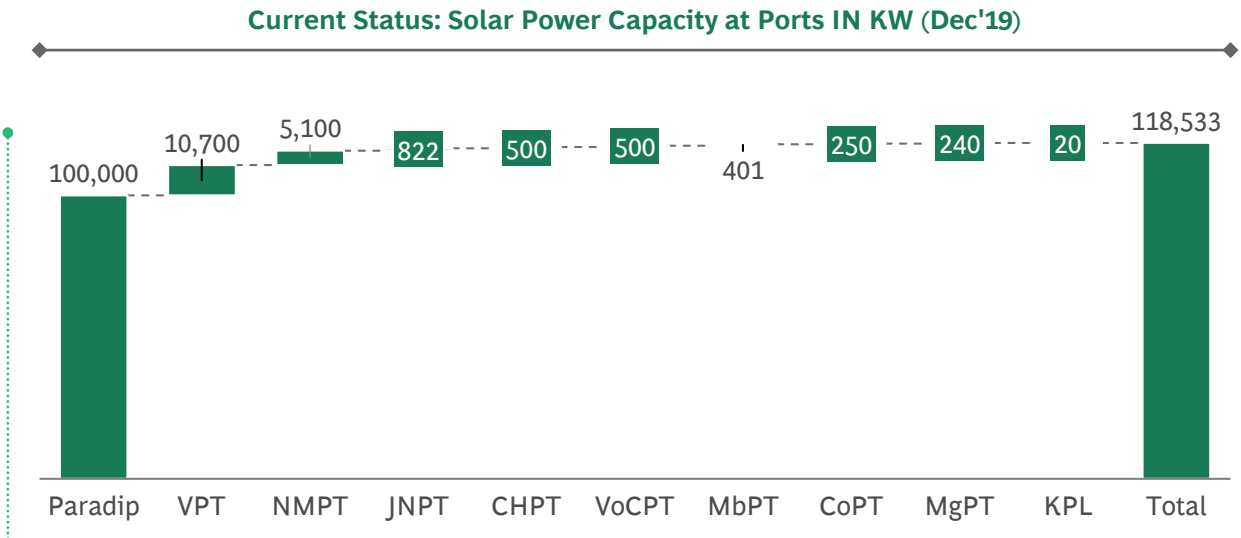
1. Usage of rooftops of offices, warehouses and other unusable land.
2. Shallow port water surfaces can be used to develop floating PV assets. Floating PV is rapidly gaining commercial acceptance.

Ports can either set up their own captive solar farms or can enter into Power Purchase Agreements (PPA) with private producers of solar energy and ensure that the power drawn from the state electricity grid is compensated by the input from the equivalent solar energy supply to the grid from designated power producers.

Indian ports can bundle their solar requirements to achieve scale economies and leverage third-party agencies to conduct a rapid assessment across ports. Following models can be considered for implementation by Major Ports:

1. **Model 1:** Capex Model wherein Ports deploy the investment & own the solar power system
1. **Model 2:** Opex (Resco Model) wherein third-party agency deploys the required investment & owns the solar power system

Exhibit 9.1 | Solar Power capacity at Major Ports



Note:
1. As on July 2020
2. Cochin Port has commissioned 250 MW of rooftop PV and floating PV mode
3. Indian ports estimated to require 30,000 MW- 40,000 MW of power in 10 years with 3% CAGR
4. Based on data received from select ports: Mormugao, Paradip, Cochin, New Mangalore

Source - TA 12 Report, Press search

3 https://renewablewatch.in/2019/11/01/cochin-port-trust-to-install-nearly-1-mw-of-rooftop-and-floating-solar-systems/
4 https://economictimes.indiatimes.com/industry/transportation/shipping-/-transport/india-to-be-first-in- world-to-run-all-government-ports-on-green-energy/articleshow/58917369.cms?from=mdr

3. **Model 3:** Annuity Model wherein third-party agency makes the invesment; Ports owns the system & makes periodic payments to the agency

2 Wind Energy:

Indian Ports to increase adoption of wind energy evaluating both onshore and offshore wind farms (Exhibit 9.2). Conventional Wind Turbines can be installed onshore in available land at port or offshore in shallow water areas within the port operational area. Industry experts foresee offshore wind growing by more than 20 percent each year over the next several years, and floating wind farms will open completely new growth opportunities.

It is the need of the hour that the Major Ports have a well-defined strategy to adopt emerging technology and focus on following steps:

1. Identify feasible areas for onshore wind farms across port land, shallow waters, and breakwaters
2. Set up windmills PPP with private wind producers and other mechanisms
3. Leverage offshore windfarms potential at southern tip of the Indian Peninsula, offshore regions around the Port of Okha, and vast salt fields of Kuchh region

9.2.2 Advanced Energy Solutions

While advanced energy solutions such as wave, tidal, hydrogen etc. are presently expensive, these are expected to become competitive in future with the advancement of technology.

1 Tidal Energy:

Globally, tidal energy plants are limited with only 500 MW capacity in operation primarily led by South Korea. Primary challenge with Tidal Projects is high cost of installation (INR 30-60 Cr. per MW). Other challenges include:

- Potential to disrupt natural movement of marine animals & migration of fish
- An intermittent energy source, provides electricity only during tide surges

According to the study done by Ministry of Non-Conventional Energy Sources, India has a potential of 8,000 – 12,000 MW of tidal energy. This includes:

- About 7,000 MW in the Gulf of Cambay in Gujarat
- 1,200 MW in the Gulf of Kutch in Gujarat
- 100 MW in the Gangetic deltas in the Sundarbans region of West Bengal and Palk Bay-Mannar Channel

Exhibit 9.2 | Comparison between off-shore and on-shore wind farms

Key model parameters	Off Shore Wind farm	On-shore Wind farm
Cost of construction & maintenance	High: due to installation away from shore	Low: due to installation in on/near ports (shallow water/ breakwaters, etc.)
Energy collection by wind mill	High: due to no physical blockages	Med: due to presence of physical restrictions
Efficiency or, voltage drop	High: due to larger cabling distance	Low: due to shorter cabling distance
Noise pollution for ports	Low: wind mills are far out in the sea	High: wind mills are on the shore
Global Examples	Europe & Scandinavian countries • Scotland has installed 5 off-shore wind turbines • 14 European ports allocated 430 ha to off-shore wind related activities	Rotterdam, Zeebrugee, Hamburg • Successfully installed wind power plants for use of power in ports and also provide energy to nearby areas
Indian Ports		• Wind farm operational at Deendayal (21 MW) • Additional project at VoCPT, Kamarajar Port

Source: Press Search

Hence harnessing of Tidal Energy can be explored with a pilot project in Gujarat.

2 Solar Thermal Energy:

Solar Thermal Power systems, also known as Concentrating Solar Power systems, use concentrated solar radiation as a high temperature energy source to produce electricity using thermal route. These technologies are appropriate for applications where direct solar radiation is high. There are a number of Solar Thermal power plants in operations globally.

Several challenges exist for adoption of Solar Thermal energy at Ports currently such as:

- Lack of large land masses with ports in India for solar thermal power plants
- High capital investment needed

This option can be explored in future by Ports to offset electricity taken from grid.

3 Wave Energy:

Ocean Waves are converted to electricity with Wave Energy Converter (WEC) devices. Five converter technologies have been researched till date:

1. Cockerel raft- Using rotary engines in undisturbed water
2. Flexible Bag energy Converter - Bag driving turbine under wave action
3. Submerged circular cylinder converter- Submerged cylinder generating power through harmonic oscillations
4. Clamp wave energy converter- Clamp driving energy
5. Oscillating water column Converter- Column Generating energy through wave action

Of these, the oscillating water column converter (OWC) has been found to be more dominant due to its simplicity and adaptability to use the existing coastal structure of sea harbours. This technology has been tried at Vizhinjam along Kerala coast by National Institute of Ocean Technology, Chennai.

Initiative 9.2: Pilot advanced energy solutions at select Ports after detailed feasibility study (e.g., tidal at Deendayal port, wave energy at Cochin port)

Ministry of Ports, Shipping and Waterways along with Ports shall conduct a detailed study to identify commercial and execution feasibility of these advanced energy solutions in the long run over the next decade.

9.3 Air Quality Improvement

Air emissions from the land and sea based sources are one of the major source of pollution in the port areas due to terminal activities. During construction phase use of vehicles, equipment for land based activities, excavation, and transportation may result in combustion emissions. During the operational phase combustion emissions from vessels add to the land based activities like cargo handling, engines, broilers etc.

Dust emissions from cargo handling and unpaved roads also contribute to the air emissions. Volatile organic compounds (VOC) from fuel storage tanks and transfer tanks are also included in the air emissions.

Sulphur-di-oxide (SO2), nitrogen oxide (NO), Carbon monoxide (CP), particulate matter (PM) are theprimary emissions from combustion exhaust and/or coal stack burning. Other substances like hydrocarbons, heavy metals and VOCs may also be emitted depending on the type of the fuel used.

The most common pollutant in fugitive emissions is dust or particulate matter (PM). These are released during project operations, transport and open storage of solid materials, and from exposed soil surfaces, including unpaved roads.

9.3.1 Clean Fuels to Reduce Vehicle Emissions at Ports

Best in class ports across the world have been actively promoting use of clean fuels across the ecosystem[5]:

Initiative 9.3: Drive adoption of multi-clean fuels (Electric, CNG, LNG) for vehicles in the port ecosystem

Indian Ports shall look to achieve 50% vehicle switch towards cleaner fuels – CNG, LNG and Electricity by 2030. Thrust area discussions led to development of a two-phase multi-clean fuel adoption approach for Ports (Exhibit 9.3):

1 Port of Singapore Authority (PSA)

- PSA is buying 200 LNG trucks as a part of a push to be greener
- These heavy vehicles will make up 15% of its truck fleet

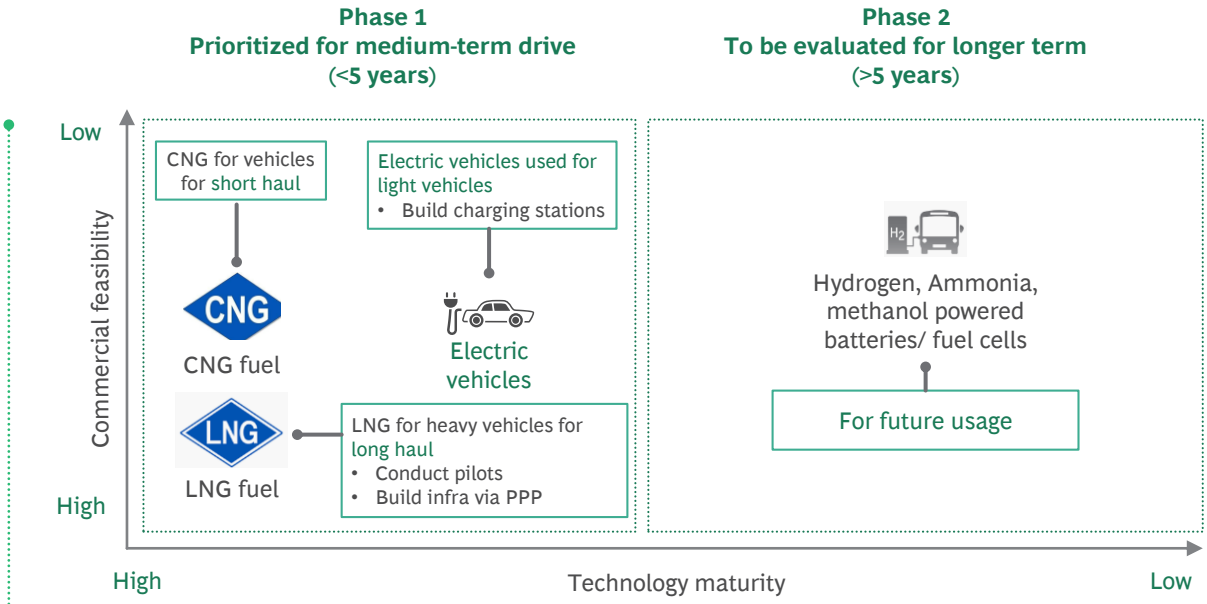
2 Port of Rotterdam

- Tractor units running on batteries used for transportation between block storage and rail terminal
- Offers incentives (monetary and queue prioritization) on clean fuel-LNG consumption

3 Port of Los Angeles

- Conducted feasibility study using Toyota's hydrogen fuel cell truck for short-haul drayage routes

Exhibit 9.3 | Multi-clean fuel strategy for vehicles at Ports



1. Ports to also strive for bio fuel blending in diesel and petrol by incentivizing trucks on queues
2. Natural gas prices is 2-3 times lower than electricity

Source: Centerpointenergy.com

5. Thrust area discussions, Respective Port websites

Phase I:

- CNG for short haul vehicles
- LNG for long haul vehicles
- Electricity for small vehicles

Phase II:

- Hydrogen, Ammonia, methanol powered batteries, fuel cells, etc. for future usage

While LNG & CNG fuels sources are attractive commercially, infrastructure availability and short-term incentives will drive full-fledged adoption across Ports. Hence, there is a critical need to build suitable infrastructure for driving clean fuels adoption at Ports.

Global Ports have collaborated with private players for clean fuels adoption:

Port of Seattle - Collaborated with Washington State Department of Transportation and Evgo to set up 2 fast charging EV stations

Port of Scotland - Formed a JV with Scottish Power & SSEN to invest $9.6M and roll out EV chargers across port

In India, Central Govt. has also taken several steps to provide thrust for PPP in clean fuel such as:

- PNGRB declared that any eligible entity can set up LNG station anywhere in the country
- Common guidelines launched to set up Dealer Operated CNG stations in India (Feb'19)

Indian ports to accelerate engagement with private players for building suitable infrastructure and also tap into CSR spending by Indian companies.

9.3.2 Reducing Air Emissions by Ships inside Port Ecosystem

Ships spend considerable time at the berth for variety of operations with vital equipment on board continuously running such as cranes, air conditioning, etc. This results in large scale emissions. Strong environment & economic benefits can be derived from with ships taking power from shore while staying at berth. Shore to Ship plays critical role in reducing GHG emissions & costs as it:

- Reduces fuel consumption by 20 metric tons
- Reduces maintenance of vessel through clean energy usage
- Reduces CO_2 emissions by 60 metric tons during a 10-hour stay in port, equal to yearly emissions of 150 cars travelling ~50km per day
- Saves fuel cost of INR 10-12 per unit (vs. diesel[6])

Standard operating procedures for shore electric power supply to ships in Indian ports have been drafted by DG Shipping that presently cover a low power supply – up to 150 kW at low voltage. There is a need to draft a policy for high voltage supply to meet any power demand of a ship after a detailed cost benefit analysis.

A Shore-to-Ship facility has been recently installed at V.O. Chidambaranar Port and is expected to reduce carbon emission by approx. 1500 Ton per annum i.e. 5% of total CO_2 emissions at berth coupled with approx. INR 74,000 per day fuel cost savings. Similar facilities shall be extended to all of the ports in next 5-10 years.

Initiative 9.4: Provide shore to ship electricity to vessels (tugboats, coastal vessels and EXIM trade vessels) in a 3- phase targeted manner through an intermediary

Supply of shore power will be a major step forward for reduction in carbon footprint for Indian ports. As per the Electricity Act in India, trading of power is not permitted by any entity other than the Distribution Companies (DISCOMs). Hence, Indian Ports shall look to onboard a subsidiary for commercializing shore to ship for vessels in phase wise manner.

Ports shall look to assign a revenue sharing contract to an external entity which will invest in the Ship-to-Shore facility and operate the same.

Firstly, Ports shall mandate and adopt current SOPs of providing shore power to all vessels up to 150 KW. For other vessels rated above 150KW or working on 60Hz power supply, Ports shall adopt a 3-phase targeted approach as follows (Exhibit 9.4):

- **Phase I:** Shore power to Port crafts and tugs working in the port
- **Phase II:** Shore power to other Indian Flag Vessel deployed for coastal navigation
- **Phase III:** Shore power to Foreign Flag vessels

6 Additional fixed costs incurred only for (~20% ships) that need frequency converters

Exhibit 9.4 | Shore-to-ship adoption roadmap

Key model parameters	12 months-36 months Port crafts & ancillary vehicles	36 months – 72 months Indian Vessels in coastal navigation	>72 months Vessels in international trade
Power consumed by vessel (Power supply readiness of State electricity board a constraint)	Low: Lesser power consumed due to smaller vessel size	Med: Due to bigger size as needed for shorter/coastal navigation	High: Larger consumption due to long haul transport
Residence at Port (Degree of emissions at ports)	High: Vessels used for internal port operations	Med: Vessels move from one Indian port to other	Low: In-transit at particular Indian ports
Social economic benefit (Cheaper options first for local Indians owning smaller vessels)	Benefit flowing to local Indians owning/ operating the vessels	Benefit flowing to local Indians operating coastal vessels	Benefit flowing to Indian & non-Indians in international trade
Vessel description	Port based tug boats	Indian Vessels carrying cargo on shorter duration (eg- from Mudra to Mumbai, Mormugao to Chennai)	Foreign vessels for export/import

9.3.3 Port Equipment Electrification

Battery or electric drive trains offer better economics than diesel engines. Hence, many global ports are opting for electrification of all equipment to reduce environmental impact and simultaneously lower operations costs.

During the last decade, industry has presented considerable improvements in drive trains for mobile equipment operating in container terminals. Today, most container handling cranes in Indian ports are driven by electric drives. In liquid cargo terminals, 90% pumping, conveying, storage and product evacuation systems including all pumps and motors are electric driven.

Tugboats with a rated power of around 5000 horsepower run on diesel power and use their full rated power for only 7% of their operation cycle making them an ideal candidate to be electrified

Initiative 9.5: Electrification program for material handling equipment across all ports

Indian Ports shall drive a 2-phased pan-India electrification program aimed to achieve more than 50% electrified material handling equipment by 2030:

Phase I: Cranes used for transferring material from Shore to Ship and vice versa

Phase II: Equipment moving cargo at port area e.g. RTGCs, reach stackers, straddle carriers, forklifts, etc.

Additionally, Ports shall mandate purchase of electrical equipment as a replacement for all further purchase to achieve full electrification over the next 10 years.

9.3.4 LNG Bunkering

The changing over of small port crafts/trucks and Ships to LNG are a step forward worth considering facilities of road delivery of LNG and bunkering facilities available in India. IOCL has taken several proactive steps to ensure availability of 0.50% Sulphur compliant fuels (e.g. RMG 380, RMG 180, MGO, etc.) and aims to supply more than 1 MT/year of LNG from its Haldia and Gujarat refinery for international and domestic bunkering.

Leading global ports in Europe, Asia and America have been actively implementing LNG bunkering

programs (Information Box 9.1). Widely known advantages of LNG fuel are as follows:

1. Lower emission of CO2, PM and NO– ~80% lower than diesel
2. Limits Sulphur content in marine bunkering to 0.5%- complying to IMO norms
3. 40%-50% cheaper than diesel

Initiative 9.6: Establishing LNG bunkering stations at select ports in line with fuel adoption trends by shipping liners

Indian ports shall aim to increase adoption of LNG to reduce carbon footprint and greenhouse gases. Currently, LNG bunkering facilities are available at Cochin Port in public sector and Jaigarh Port in private sector. Kolkata Port Trust has set aside about 10 acres of land within Haldia Dock Complex to introduce LNG as a fuel for barges. Also, Indian Oil Corporation and Bharat Petroleum Corporation are in discussions with the Maharashtra Maritime Board (MMB) to build LNG bunkering facilities in the state.

Going forward, Indian ports shall adopt a 3-phased approach to increase adoption of LNG with bunkering facilities in next 5-10 years:

- **Phase I:** Promoting LNG based ship vessels through awareness programs
- **Phase II:** Establish bunkering on pilot basis in select LNG terminals (e.g.- Chennai Port)
- **Phase III:** Promote LNG bunkering with subsidies for retrofitting needs

9.3.5 Dust Emissions Management

Air emissions at Indian Ports are primarily due to container handling of dry bulk material and diesel consumption. Dust emission is another major issue across Indian and international ports, typically generated from bulk material (coal and iron ore) storage and handling sites.

During construction phase, land-based activities e.g. excavation, transportation may result in combustion and fugitive emissions. During operational phase, combustion emissions from vessels, and diesel based auxiliary engines add to the fugitive emissions with land-based activities like cargo handling and unpaved roads. Diesel consumption per annum[7] at Indian Ports range between 500 KL and 5000 KL emitting hazardous emissions (CO2, CO etc.).

Leading ports leverage efficiency enhancement techniques to reduce air and dust emissions (Information Box 9.2). While Indian Ports have initiated monitoring emissions, there is significant potential to drive automatic emission monitoring at all Ports.

Information box 9.1

Rotterdam
- Change of Rotterdam's by laws in 2014 made it 1st hub for official ship-to-ship LNG bunkering of sea-going vessels
- Tank-to-ship and truck-to-ship options also available

Hammerfest
- Biggest LNG bunkering facility in Norway, with storage capacity of 1,250m3 and pump capacity of 90 tonnes per hour (tph)

Barcelona
- Became an LNG bunkering facility in Jan'17 as part of city's air quality improvement plan, focusing on using LNG as marine fuel

Singapore
- Started LNG bunkering pilot program in a bid to trial operational procedures & safety protocols for practice
- Preparing to offer services to a range of vessels when fuel becomes adopted worldwide.

Yokohama
- Completed 1st phase of development works to build an LNG bunkering facility at beginning of this year, introducing a truck-to-ship bunkering service

Montreal
- Started offering LNG bunkering services & has acquired 4 LNG-fueled vessels designed to comply with latest environmental standards

Jacksonville
- Only hub on US East Coast to offer on-dock & near-dock LNG fueling services

7 Discussion with Ports, IPA

Information box 9.2

Port of Hamburg

- Smart lighting
  - Connected streetlights to sensors through IoE (Internet of Everything) approach
  - System recognizes traffic levels and turns on/off lights accordingly
  - Energy saving takes place by illuminating empty roads with less fuel and reducing carbon emissions
- IoT sensor program
  - Measuring fine dust emissions at various port locations
  - Conducted active monitoring and assessment of emission of PM2.5 and PM 10

Port of Rotterdam

- Ship tracking for tracking vessel arrival time
  - Ensures ships are not held offshore for extended time period while consuming energy
  - Makes sure clean energy supply is readily available when in port to reduce auxiliary emissions
  - Ensures areas are lit only when operations are carried out
- Dust abatement techniques such as applying crusting material to avoid dust being blown away

Port of Brisbane

- Automated sprayer networks
  - Network of sprinklers for coal dust suppression during loading /unloading and in response to wind conditions
  - Monitoring of wagon tops and hoppers for preventing overflow and optimizing operations (traffic movements etc) to reduce dust
  - Real-time air quality monitoring across port

Initiative 9.7: Increase usage of efficiency enhancements techniques such as ship-tracking and smart-lighting at ports to move towards CO2

Major Ports shall install Continuous Ambient Air Quality Monitoring Stations (CAAQMS) hooked to servers of State and Central PC Boards for real time monitoring and feedback. For instance, Paradip & Mormugao Ports are operating on automatic emission monitoring.

Ministry of Ports, Shipping and Waterways shall conduct a pilot at select ports to deploy efficiency enhancement techniques such as ship tracking & smart lighting to decrease air emissions.

Initiative 9.8: Develop and issue guidelines on dust management to drive ports to adopt modern practices in a phase-wise manner

Indian Ports shall deploy a dust emission management program leveraging sensor-based tracking technology and 6 key techniques as:

1. Employ use of dust control methods - water sprinkling, covering of material by waterproof fabrics, water suppression for loose material etc.
2. Conduct air extraction and treatment through a baghouse or cyclone for material handling sources
3. Cover storage and handling areas for pulverized coal and pet-coke and dust emanating cargo
4. Employ use of telescoping arms and chutes to minimize free fall of materials
5. Use slurry transport, pneumatic or continuous screw conveyors and cover other types of conveyors
6. Minimize dry cargo pile heights and contain piles with perimeter walls and build barriers to break winds

9.4 Optimizing Water usage and Improving Green Cover

9.4.1 Water usage optimization

Water quality may be affected due to construction and operation of ports despite best of the measures. Activities like deck cleaning, dredging, reclamation, ship movements, cargo transfer and oil spillage result in increased turbidity due to sediment suspension and sometimes toxicity. In addition, the port premises also generate ef-

fluents like sewage, storm water and ship waste (sewage, ballast, bilge etc.). While most of the Indian Ports are using recycled water for gardening and landscaping, many ports lack sewage treatment plants today.

Unregulated spills and vehicular/machinery maintenance activities of smaller nature results in poor surface and ground water quality. National Oil-spill Disaster Contingency Plan (NOSDCP) has been revised in 2015 and provides all the necessary details and functional responsibilities of various agencies. The ports are responsible for oil-spill clean-up within port limits, and oil-handling agencies are responsible for oil-spill clean-up up to 500 meters around the oil-handling installations.

Another source of water pollution in limited treatment of ballast water at Indian Ports. Ballast water is taken onboard by ships for stability purposes and potentially comprise of invasive marine species. International Convention for Control and Management of Ships' Ballast Water and Sediments mandates all ports to control transfer of invasive species in marine ecosystem.

Moreover, port operations consume considerable amount of fresh water for activities such as:

- Water sprinkling over dusty cargo
- Firefighting
- Greenbelt
- Gardening/landscaping
- Ballasting
- Others (toilets, truck washing, road cleaning, supply to ships and domestic water requirement at port's residential complex)

Water conservation can be achieved in ports through a combination of changing behaviour, modifying and/or replacing equipment with water saving equipment and increasing internal reuse. Recycle and reuse is also an important aspect of reducing fresh water requirements which provide a reliable source of water.

Initiative 9.9: Build infrastructure (sewage treatment plant) in 2-phase manner and develop oil spill response plans

A **Indian Ports need to collaborate with private players to build Sewage/industrial wastewater treatment plants as below:**

Phase 1:

1. Conduct pilot at select ports to establish end to end infrastructure on sewage collection, storage, transfer and recycling treatment first for colony/township
2. Build catchment areas to avoid sewage water getting into surface water
3. Treatment of Oily waste from hazardous material- Used oil can be recycled & centrifuged with application in cement industry etc.

Phase 2:

1. Incorporate learnings from pilot and expand coverage to all ports
2. Establish and extend similar infrastructure for wastewater treatment at Ports operational area

B **Indian Ports shall also focus on development of robust oil spill response plan as follows:**

1. Prepare focused oil spill response plans (e.g. Spill Control and Emergency Management Plan) in collaboration with other stakeholders such as Navy
2. Start satellite images monitoring system for maximizing possibilities of detecting monitoring oil spills
3. Build oil sensitivity maps guaranteeing fast & effective oil spill response operations
4. Focus on environmentally sensitive areas/ receptors (e.g., mangroves, corals, aquaculture projects, and beaches, etc.)

C **In addition to above, MoPSW need to drive international norms compliance for meeting ballast water management standards in a phased manner:**

Phase 1: New ships meet ballast water treatment standard

Phase 2: Existing ships exchange ballast water mid-ocean but need to meet ballast water treatment standard by date of specified renewal survey

Phase 3: All ships to install on-board ballast water treatment system

Initiative 9.10: Employ water conservation techniques at select ports by deploying atomizers / mist canons on pilot basis and expand to other ports

There exists a need for judicious use of water to reduce wastage. Major Ports shall drive a water conservation program through atomization technology. There are three key applications of atomization technology at ports:

1. Water mist dust suppression system: Provides better performance to the water mist protection and same time save the water use. The water mist system has to be designed in a way that discharges water mist simultaneously to protect all hazards in an enclosure.
2. Water mist fire-fighting system: PHighly effective in fighting fires, because while extinguishing a fire, water mist produces a higher rate of heat extraction and same time uses less water. The firefighting turbine can operate with water, foam or a mixture of water- and foam.
3. Water mist system in domestic use: Atomized nozzle turns tap water into a fine mist to radically reduce amount of water needed

Atomization technology offers multiple benefits to the ports such as:

1. Reduction in water usage by 1/20th through usage of Atomizers due to release of water in mist spray form
2. Minimization of infra costs, including total treatment and discharge costs

   Ability to manage in-situ water sources/ augment limited primary water source
3. Reduction of wastewater discharges into receiving environment

MoPSW shall conduct a pilot at select ports to encourage use of atomizers / mist canons for all bulk cargo handling Major Ports.

9.4.2 Green Belt

The rationale behind greenbelt development around ports is to capture the fugitive emissions, attenuate the noise generated and improve the aesthetics. Greenbelt is beneficial in many other ways, such as:

- Supports biological diversity and maintain pleasant microclimate in the region
- Retention of soil moisture
- Erosion control and coastal protection
- Recharge of ground water
- Absorb pollutants from environment and helps in effective pollution control, like atmospheric CO2 sequestration

Guidance Manual for Environment Management Plan (EMP) prepared by MoEF&CC mandated for greenbelt development in the ports to contain air and noise pollution in the vicinity. As per the stipulations, greenbelt has to be provided all around the ports by planting trees, and the total green area including landscaping area would be about 33% of the port area.

Currently, most Indian Ports baring the ones with vast tracts of land reserves are facing challenges to comply with the recommendations of the Ministry of Environment, Forest and Climate Change (MoEFCC) for greening 33% of area. % of greenbelt varies from 3% to 36% across ports.

Hence, all ports shall strive to develop adequate green belt near material handling area and increase coverage in next 5 years. For ports with inadequate land near the material handling area, ports need to develop green belt in other available land. Also, new recommendations for permitting green belt alternative land must be implemented through discussions with MoEFCC.

Initiative 9.11: Develop green belt (including mangrove, mudflats) cover at ports with participation of corporates under CSR programs

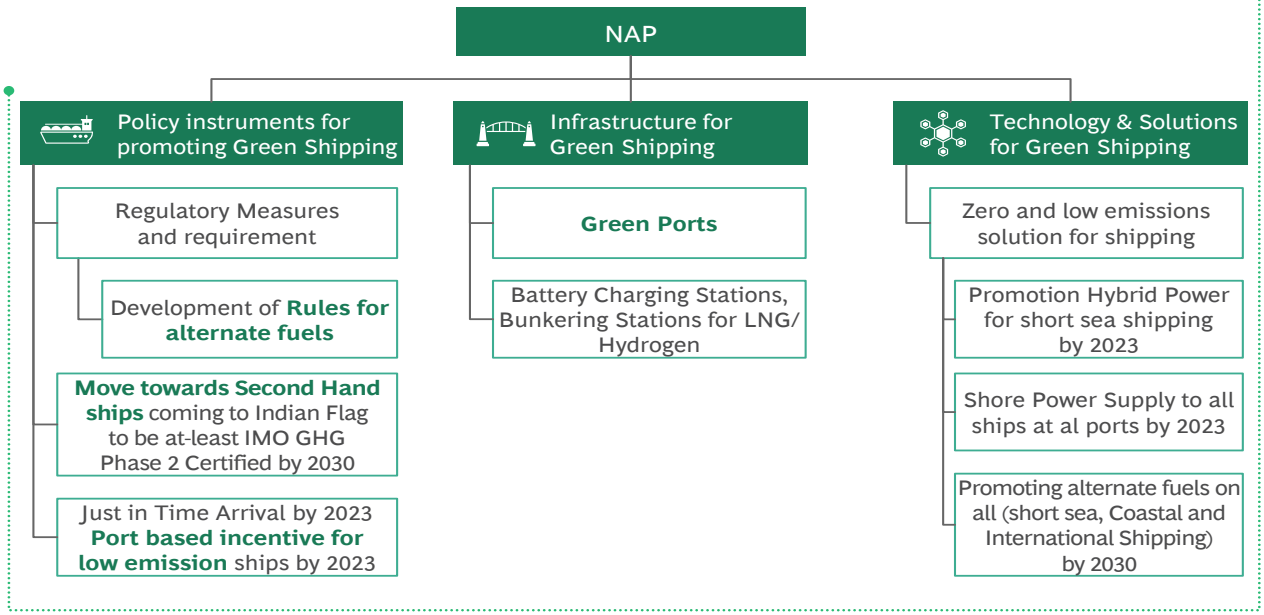
In recent years, multiple Govt. bodies have been pushing for Green cover under CSR funds from business corporates. Private players plant saplings/trees and also get brand visibility through hoardings. For example:

1. Airports exploring to leverage CSR funds for maintenance of greening
2. GMDA (Gurugram Metropolitan Development Authority) launching green initiative to increase city's green cover under CSR
3. Chandigarh Chowk greened under CSR initiative

Hence, Indian Ports shall explore CSR model to engage private players to carry out greening at Indian Ports. Also, Ports shall align policy revisions with MoEFCC to get permit for Mangrove plantation in alternate land and develop mangrove under 33% greenbelt cover.

Another potential area to develop Green cover are active mudflats. Mumbai port trust have already been planning parks and gardens on East coast's mudflats, including Mahul creek & mangroves near Sewri fort. MoPSW shall drive discussion with MoEFCC to exempt active mudflats within CRZ notification framework 2011/2019 to drive port green initiatives.

Exhibit 9.5 | National Action Plan to promote Green shipping



9.4.3 Green Shipping

Multiple pro-active measures have been undertaken to curb marine pollution in India such as:

1. Swachh Sagar Portal: To facilitate Port Reception Facilities
2. Ratifying Hong Kong Convention: Portal for Objective Measurement of Safety, Environmental and Social Indicators
3. Single Use Plastic Ban: Portal for facilitating replacement of SUP
4. Risk Assessment of Indian Coast: Move towards ratification of Ballast Water Convention
5. Mandatory Submission of Fuel Oil Consumption irrespective of Gross Tonnage
6. Efforts towards Shore Power Supply

In addition, National Action Plan has been prepared to promote Green shipping in India (Exhibit 9.5) with focus areas as:

1. Policy instruments for promoting Green Shipping
2. Infrastructure for Green Shipping
3. Technology and Solutions for Green Shipping

Initiative 9.12: Drive adherence to National Action Plan for green shipping for safety and quality of vessels

Major Ports need to provide adequate reception facilities for proper disposal of waste from ships for disposal of oil residue mixture and garbage generated by vessels. In addition, ports shall ensure strict implementation of PRF guidelines as follows:

1. Ship master to report inadequacies of PRF at port
2. Ship master to fill advance notification form for waste delivery to PRF
3. Reception facility provider to fill waste delivery receipt

9.5 Improving Solid Waste Management

Waste generated at the port include solid waste (from construction or otherwise), domestic waste, etc., street sweepings, garden wastes treated plant residues, packing materials, bags etc.

Solid waste collection and transport involves storage at the generation and pick-up points, pick up by the crew, trucks driving around the neighborhood, and truck transport to a transfer station or disposal point. In general, the ports must have facilities for collection of the Municipal Waste from the Staff residential areas, common user areas and other relevant areas.

The collection from the common storing areas is done by the Port authority which is transported to the transfer station on a daily basis. At the

transfer station, partial or complete solid waste processing such as sorting, shredding, compacting, baling, or composting may be provided. It is important that the transfer station be located as near as possible to the generation center. Good access roads as well as secondary or supplemental means of transportation are necessary and most importantly the site must be environmentally acceptable.

Major Ports generate 20 to 30 tonnes of solid waste per day. % of Solid waste recycled by Indian Ports vary widely in range of 10%-70% due to inefficient recycle and reuse of degradable solid waste. For example, transfer station for sorting waste is not located as near as possible to collection point, acting as a constraint for 100% waste segregation and recycling.

Major Ports have undertaken several activities to promote cleanliness in the port premises. Some of the activities include cleaning the wharf, cleaning and repairing of sheds, cleaning and repairing of port roads, painting road signs, modernizing and cleanliness of toilet complexes, placement of dustbins, etc.

Initiative 9.13: Strengthen solid waste & plastic waste management program to improve waste segregation, recycling and re-use in alignment with Swachh Bharat Mission & promote waste to wealth

Indian ports need to adopt a 2-phased approach to drive E2E solid waste management (collection, segregation, recycling & reusage):

Phase 1: Conduct pilot at select ports to ensure single entity, with physical proximity w.r.t waste collection & segregation, drive waste management

- Place enough litter and recycling bins in port areas
- Incorporate learnings from pilot and expand coverage to all ports

Phase 2: Recycling to promote waste to wealth

- Increase recycling from segregated material & re-usage of waste / recycled material (e.g. in civil construction or any other innovative purpose for public use)
- Promote use of bio-degradable waste for production of useful by-product for public & environmental use

9.6 Dredging material Recycling

Dredging is an activity associated with the Maritime development from the initial stage for creating of the facility and continue all along for maintenance of the created facility. Every year each port produces considerable amount of dredged material which needs to be taken care of.

Capital dredging material are often used partly for reclamation and creation of new land and partly dumped in the sea as is maintenance dredging material. Every year millions of cubic meters of materials are dumped in the sea and goes waste while creating environmental damage.

Hence, it is prudent and worthwhile to evaluate new ways for re-use of the dredged material. The dredged sand can be sandy or silty sandy based on the location of the Indian coastline. Courser material are more useful for the reclamation purposes. Even sands with high content could be used for this purpose and resulting land could be used for gardening, which is also an important milestone to meet by the ports.

The maintenance dredging sand is used for protection of the beach erosion and creation of artificial beaches and habitats as well the geography permitting.

Currently the dredged material at the Indian Major Ports are used mainly for four purposes:

1. Breach Nourishment through bypassing of Littoral sand e.g. East Coast Ports
2. Land reclamation
3. Land fill
4. Use for Construction material e.g. Cochin Port

For example, in the private sector ports at Mundra in Gujarat and Jaigarh in Maharashtra, largescale land reclamations and grading has been carried out using dredged material. In addition, the dredged sand is also being considered as a main source of supply for the construction sand in the state of Kerala through PPP participation on revenue sharing basis.

Also, beach nourishment activities have been carried out by Major Ports such as Vishakhapatnam beach by Vishakhapatnam Port Trust, down drift shore line protection at Paradip Port, etc.

Initiative 9.14: Employ sustainable dredging disposal mechanism to improve dredging material that is recycled and re-used at ports

A detailed dredging methodology to be developed through study of the dredged material for its chemical and physical properties, identification of the disposal location, and the study of biodiversity:

1. Techniques adopted for dredging to be such that there is minimum suspension of sediments
2. Measures like barrier/ sheet piles, bubble curtains/ screens, sediment transport system to be explored to minimize the suspension of the materials in the water column.
3. Dredging activities to be planned such that breeding and migration periods are not impacted.
4. Physical, chemical and biological properties of the dredged materials to be analyzed and re-usable methods to be explored.

With significant dredging required across Major ports in next 3 to 5 years, PPP model can be an effective option to carry out sustainable dredging. Major Ports shall collaborate with dredging partners to deploy sustainable dredging disposal mechanism as follows:

Phase 1: Recycle

- Conduct pilot at select ports and initiate risk assessment and planned recycling of 30% dredged material
- Expand coverage to other ports incorporating learning from pilot

Phase 2: Re-use recycled material

- Build port wise plan for reuse of dredged material for construction & building material (e.g.- recreation projects), brownfield replacement fill, capping of soft fills (applicable in swampy areas), soil enhancement etc.

9.7 Zero Accident Safety Program

Safety at Ports has become increasingly important, on account of the fact that increase in the safety consciousness not only makes the workers more secure, but also improves productivity and efficiency. Indian Ports need to enhance their Safety Culture, comprising of risk anticipation and pro-active tackling, a collective team approach, rules compliance and safety habits meshing with each other.

Ports need to have strong and effective health and safety systems in place. These should ensure co-operation, co-ordination and communication

Information box 9.3

Best-in-class practices to improve safety at ports

Institutionalizing Safety measures

- Process reengineering for safety- Advanced planning for movement of containers to prevent overlap with human movement
- Accident prevention through vehicle tracking
- Spill management program: Provide spill trailers, kits, spill bund

On-ground checks & monitoring

- Periodic infra check- HOD conducts weekly checks of roads and trucks conditions
- Periodic monitoring of KPIs

Tailor made training programs for Ports employees as follows:

- Curriculum: job-based safety indication, buddy training, tests
- Duration: Classroom training is ½ days; Practical training basis job-profile:
  - Operator- 21 days including buddy training
  - Driver – 7 days
  - Others- 3 days (depending on job risk)
- Frequency: Conducted once per year and special training for any accident/incident

Awards & Safety Culture

- Awards on key indicators to measure and monitor performance development
- Culture of excellence program to drive customer centric approach including safety standards for its employees

Source: Expert discussions with DP World, Maritime Authority of Singapore, and Abu Dhabi Ports

between all employers and their workers. The Management of Health and Safety at Work Regulations set out a number of requirements for employers to ensure they are adequately managing health and safety. These include:

- A risk assessment of activities. This should identify the measures ports need to have in place to Comply with their duties under health and safety law and reduce risks so far as is reasonably practicable;
- Making sure there is effective planning, organization, control, monitoring and review of the measures put in place;
- Appointing a competent person to provide health and safety assistance.
- Co-operation and co-ordination with other employers sharing a workplace.

Leading international ports and domestic terminals have formulated best-in-class practices to improve safety at ports (Information Box 9.3). Safety as culture must be imbibed in each of the employees for them get acquainted with the culture and continuous training.

Major Ports need to strengthen safety at ports across 5 key elements to achieve Zero accidents:

1. Risk assessment & audit: Ensure staff and worker safety through self-audits and process re-engineering
2. Accident related to equipment & safety: Reduce equipment handling related safety accidents
3. Safety with respect to hazardous material: Ensure E2E hazardous material management (e.g. hazardous material collection and training)
4. Culture of training & safety: Promote holistic safety culture (through rewards, etc.) through regular training, audits, safety weeks, KPI reporting, adoption of safety certification
5. Personnel safety via process re-engineering: Ensure port workers safety through redesigning material handling process

9.7.1 Risk Assessment & Audits

Risk assessment shall be carried out through external agencies and accordingly effective control measures shall be decided for mitigating the risks in a safe manner.

Initiative 9.15: Conduct periodic risk assessment (e.g. MTMSA) to ensure 'Zero accidents' at Indian Ports and ensure better management of hazardous material

While guidelines for handling various types of cargo are already published by ports such as handling on board the ship, unloading & transportation of the cargo, etc., there is high potential to improve risk assessment & management at Indian Ports.

Major Ports need to follow globally recognized guidelines like MTMSA (Marine Terminal Management and Self-Assessment) for conducting safety audits (Exhibit 9.6). A structured methodology to be deployed for strategic and operational risk management as follows:

- Facilitate evaluation & management of daily uncertainties port operator faces
- Help ports understand key risk exposures - such as wharves, cranes, pilot, and tug services
- Help execute risk strategy in collaboration with key suppliers
- System-based incident or accident reporting mechanism

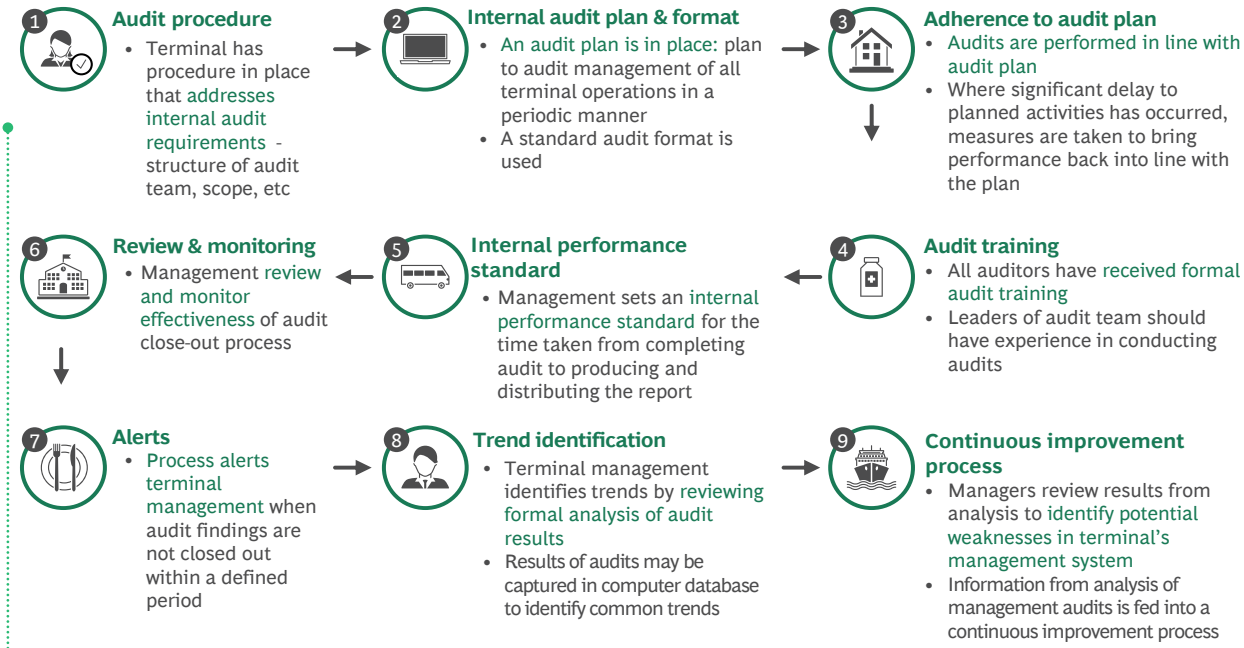
9.7.2 Safety Training

While safety training programs for workers already exist at most Indian Ports, there exists a need to strengthen the training programs to reach 100% staff trained in areas specific to their job. International Ports have deployed exhaustive training programs for port workers such as:

1. German seaports collaborate with training specialists to offer a range of trainings (e.g. equipment training, cargo stowage, etc.)
2. Port of Felixstowe (UK) and Port of Baltimore have deployed Crane simulators for training

In India, while DG-Coast Guard oversees any Oil Spill disaster as per National Contingency Plan, National Disaster Response Force (NDRF) is the agency to tackle any disaster like situations. There exists a need to setup a unified authority in maritime sector to streamline safety training & incidence response.

Exhibit 9.6 | MTMSA best practices and guidelines



Note: MTMSA - Marine Terminal Management and Self Assessment

Initiative 9.16: Strengthen training program for port workers through a 2-pronged approach - mandatory induction training and periodic refresher

Indian ports should focus on strengthening the training program for port workers as follows:

1. Conduct mandatory safety induction training specific to their area of operations
   - STS cranes
   - Rubber Tyre gantry Cranes
   - Internal transfer vehicles
   - Forklifts and reach stackers
   - Straddle carriers
2. Establish a recurring training refresher (every 3-5 years) for each worker
3. Update safety training through learnings from periodic incident assessment

In addition, MoPSW shall establish a Centre of Excellence with below main roles:

1. Data assimilation:
2. Safety incidents and accidents: Trainings conducted and incidence reporting
3. Capacity building of ports and peer audit
4. Emergency response centres for oil spills
5. Training and upgradation
6. Safety Champion of the month Scheme to enhance participation of employees, ownership & responsibilities toward safety.

9.7.3 Process Reengineering

Another area of concern, from a hazard standpoint, is gap in facility designs at ports. These gaps can occur due to isolated and phase-wise development across ports. Cargo handlers face highest risk among port workers due to falling load, reversing vehicles, trailer coupling, etc.

International ports (e.g. Port of Singapore and Port of Hamburg) have implemented various digital and process transformation measures to reduce physical hazards such as:

- Automated cargo handling
- Slot booking process to reduce truck bottlenecks
- GPS tracking and geofencing for truck movement tracking

Initiative 9.17: Conduct process reengineering by redesigning material handling operation at Indian Ports to reduce physical hazards at Indian Ports

MoPSW shall conduct pilot at select Ports for process re-engineering of handling & movement activities. Key focus areas to be:

- Re-design of materials handling operations and layout simplification
- Separating people from vehicle traffic area e.g. one-way vehicle passageways
- Reduce access and transit routes where suspended loads pass overhead port workers

Learnings shall be incorporated from pilot and coverage expanded to all ports accordingly.

9.7.4 Disaster Management Plan

Emergency/disaster is an undesirable occurrence of events of such magnitude and nature that adversely affect operations, cause loss of human lives and property as well as damage to the environment. Ports and related infrastructure are vulnerable to various kinds of natural and man-made disasters such as flood, cyclone, tsunami, earthquake, major fire, explosion, nuclear attacks, etc.

An effective Disaster Management Plan (DMP) helps to minimize the losses in terms of human lives, assets and environmental damage and resumes working condition as soon as possible. The overall objective of a disaster management plan is to make use of the combined resources created or available at the site and/or off-site services to achieve the following:

- Prevention of danger or threat to any disaster.
- Evacuation rescue & relief.
- Prompt response to any threatening disaster situation or disaster.
- Mitigation or reduction of risk of any disaster or its severity or consequences.
- Rehabilitation and reconstruction.

9.8 Occupational Health at Ports

Ports are often a challenging place to work, dealing with a whole range of cargoes and a wide variety of people, from various backgrounds and nationalities. Port operations create a wide variety of environmental impact and pollutants right from the stage of construction to maintenance and operations. Hence, it is necessary to put appropriate environment, health and safety measures in place to manage these risks properly.

The principal health hazards that can arise from port operations may include:

1. Physical hazards: extreme temperatures, noise, vibrations, radiation, lighting, etc.
2. Ergonomic hazards: repetition of movements, extreme postures, etc.
3. Chemical hazards: inflammables, irritants, toxic substances, exhaust emissions, explosive substances, etc.
4. Biological hazards: animals, microorganisms, bacteria, viruses, fungi, etc.
5. Psychosocial hazards: work-related stress, violence and harassment at the workplace, fatigue, night work, shift work, etc.

These hazards should be effectively controlled in accordance with national legal requirements. Health hazards should be identified, the risks known and evaluated, the dangers to health understood and effective preventive measures put in place to ensure the health of the Port workers concerned. There should be a management system for identifying such risks and a strategy for responding to them.

Port workers should be fit and protected from health hazards that may arise from the activity itself, the means to carry out that activity, the work environment or the organization of the work. This section provides guidelines for identifying the risks and detailing the action plans that should be taken to avoid them.

9.8.1 Health Services

Port workers are at risk of occupational health hazards due to slippage, fire, explosions, exposure to toxic chemicals, dust at ports, etc. Although necessary Medical Centers exist, there is a need that relevant occupational health services are ensured at each port.

Initiative 9.18: Implement special medical or occupational health services aimed at providing swift essential safety aid to port workers

Indian Ports need to strengthen occupational health services for port workers to reduce fatalities, injuries and diseases. Specific action items are required to be taken in two primary areas:

1. Medical Officer training: A formal training program on occupational health hazards relevant to respective port (based on incidents witnessed in the area) to be institutionalized for better diagnosis and treatment.

2. Health services: In addition to basic necessities, Indian ports need to provide:
   - Fast speed boats for ferrying injured / sick persons
   - 24X7 ambulance at operational port premises
   - Stretchers, clean blankets & suitably placed first-aid boxes
   - Means to rescue from drowning

9.8.2 Medical Monitoring Program

Leading UK ports have employed fingerprint drug testing across 4 stages: Pre-employment, Monthly random tests, For cause, and Post-incident.

There is significant potential to improve health checkpoints at induction / pre-employment screening of port workers. Ports need to understand and document medical history of worker for better treatment in future for both physical health and mental health.

Initiative 9.19: Implement a Medical Monitoring Program for port workers through active pre-screening and regular worker health documentation

Indian Ports shall institutionalize a Medical Monitoring Program (MMP) for proactive health screening and monitoring of port workers. Ports shall drive active documentation & monitoring of worker health through four steps:

1. Pre-employment screening: Medical examination & history checks at induction
2. Continued health monitoring: Periodic checks on health conditions of port workers
3. Adequate follow-ups: Diagnosing health issues and action plan on identified issues
4. Patient-doctor confidentiality: Electronic documentation of medical history, monitoring and updates

9.8.3 Health Infrastructure

Currently, Port Trust health centers or hospitals offering medical services to port workers, staff, sea farers etc. are run by Port Authorities. These hospitals primarily offer basic medical services at nominal costs and refer patients to other super-specialty hospitals.

Major Port Trusts are currently looking to invite private parties to establish modern infrastructure over the port land or manage existing hospitals. For example[8], Mumbai Port Trust currently has a 200 bed Port Trust Hospital in Wadala for approx. 45,000 port employees. Port Trust has allocated 10 acres of port land on lease to a private player for constructing a 600-bed super specialty hub under PPP model with an estimated cost of INR 639 Cr.

Initiative 9.20: Enhance infrastructure capabilities (hospitals, bed and staff) via PPP

Major Ports shall focus on transforming Port Trust Hospitals into Super-specialty health centers, Medical colleges & PG courses through PPP. Port can look to collaborate with private investors through a revenue sharing model wherein ports offer land and investors build or upgrade the facility. Transformation shall be carried across ports in phases:

Phase 1: All city proximate hospitals (Paradip - already underway, Cochin, Chennai, SMP Kolkata, and Vishakapatnam)

Phase 2: Remaining Major Ports based on learnings from Phase 1

9.9 Real-time Centralized Monitoring

Global ports have focused on gaining compliance to multiple international regulations and standards on Health, Safety and Environment such as:

1. ISO 140001 – Environment Management System
2. OHSAS 18001 – Health & Safety
3. MARPOL – International convention for the prevention of pollution
4. International Labour Organization (ILO) Code of Practice for Safety and Health in Ports
5. IMO Code of Practice for Solid Bulk Cargo (BC Code)
6. International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (IBC Code)

8 Discussions with Mumbai Port and IPA

7. International Code for the Safe Carriage of Grain in Bulk (International Grain Code)
8. Code of Practice for the Safe Loading and Unloading of Bulk Carriers (BLU Code)
9. International Maritime Dangerous Goods Code (IMDG Code)

Additionally, Global and domestic ports have signed up to set emission reduction targets like an international initiative called "Science based Target Initiative (SBTi)". SBTi is a collaboration effort between Carbon Disclosure Project (CDP), United Nations Global Compact (UNGC), World Resources Institute (WRI) and Worldwide Fund (WWF) that helps companies set GHG emissions reduction targets.

Limited formal, consolidated and documented HSE policy or goals (including roadmap) exists in the context of Indian maritime sector

Initiative 9.21: Build a real-time monitoring program to track key HSE KPIs across ports and shipyards aimed at reducing emissions, improving safety and promoting collaboration

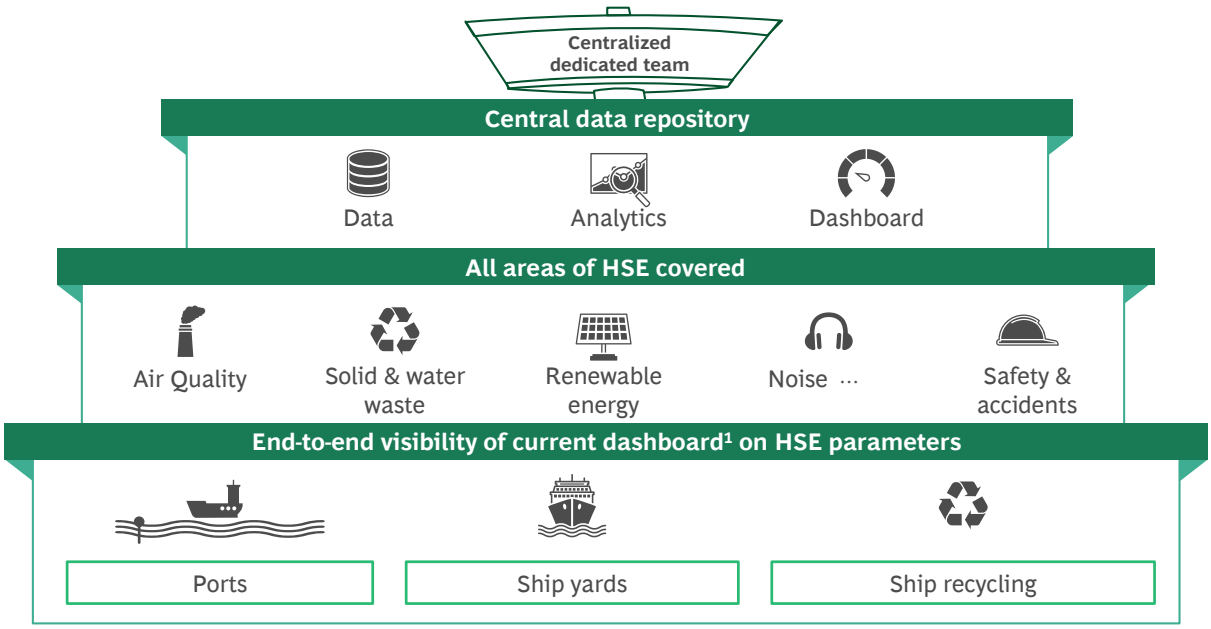
Indian Ports need to further strengthen standard monitoring practices through:

- Uniform & clear ambition targets as per International standards
- Standard Global reporting framework
- E2E system-based capturing & tracking of HSE related information

In line with above, Indian ports shall implement a centralized real time monitoring system to ensure minimum standards of adherence and expectations from the various stakeholders. Once implemented, performance could be monitored on measurable parameters and shared on the common national dashboard for experience sharing at regular intervals (Exhibit 9.7).

This will help in monitoring and analyzing key HSE trends & causes (Information Box 9.4). Moreover, centralized system will ensure E2E Visibility & transparency across ports.

Exhibit 9.7 | Centralized real time monitoring across key HSE metrics



1. UNNATI, ports ERP, MoEFCC environment dashboard etc

Information box 9.4

Centralized monitoring mechanism to be devised as per the stipulations of the CBCB and MoEF&CC guidelines. The following parameter monitoring will be mandatory:

Air quality / Emissions

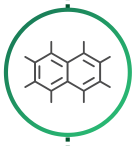
- Particulate Matter10 (PM10)
- Particulate Matter2.5 (PM2.5)
- Sulphur Dioxide (SO2)
- Oxides of Nitrogen (NO2)
- Carbon Monoxide (CO)
- Ozone (O3)
- Lead (Pb)
- Ammonia (NH3)
- Benzene (C6H6)
- Benzo (O) Pyrene (BaP)
- Arsenic (As), and
- Nickel (Ni)

Water Physico-chemical parameters

- Temperature, pH, Salinity, Conductivity, TDS, Turbidity, DO, BOD, Phosphate, Nitrate, Sulphate, Chloride,
- PHc, Lead, Mercury, and Chromium.

Water Biological parameters

- Chlorophyll
- Phytoplankton (No. of species and their density)
- Zooplankton (No. of species and their density)



Soil Quality

- Texture, pH, Sodium, Potassium, Phosphate, Chloride, Sulphate, PAH, Lead, Mercury, Chromium, and Organic carbon

Biological Parameters

- Benthic Meio-fauna
- Benthic Macro-fauna

Safety performance

- First Aid case (FAC)
- Medical Treatment case (MTC)
- Restricted work case (RWC)
- Lost Time Injury case (LTI)
- Fatal
- LTI + Fatal

9.10 Conclusion summary

Eight key interventions were identified to improve the Safety and sustainability at Indian ports and maritime bodies:

1. **Renewable Energy:** Make Indian Major Ports green & sustainable by increased usage of renewable energy (solar, wind and advanced energy solutions)
2. **Air Quality improvement:** Improving usage of clean fuels and other measures at ports
3. **Water usage optimization:** Developing water treatment infrastructure and employing water conservation techniques across ports
4. **Improving Solid Waste management:** Improve waste segregation, recycling & re-use and promoting waste to wealth in alignment with Swachh Bharat Mission
5. **Dredging Material Recycling:** Employing sustainable dredging disposal mechanism to improve dredging material that is recycled and reused at ports
6. **Zero Accident Safety Program:** Improving safety across key elements - risk audit, safe equipment handling, process re-engineering, and safety culture & training
7. **Occupational Health management:** Drive medical monitoring of workers and strengthen occupational health centres & services across ports
8. **Centralized Monitoring:** Driving compliance to international standards, conduct robust target setting and ensure central monitoring of KPIs

As part of Vision 2030, globally benchmarked targets have been defined to help India improve Safety and sustainability at Ports (Exhibit 9.8)

Exhibit 9.8 | KPI targets and impact

	S.No2	KPI measure	Current measure	Target
Environment	1	% share of Renewable energy consumption at ports (self generated + procurement from grid)	<10%[2]	>60%
	2	% Port equipment electrified	-	50%
	3	% area under green belt	<10%[3]	20%[1]
	4	% reduction in CO2 emission / ton of cargo	-	30%
	5	% reduction in fresh-water consumption / ton of cargo	-	20%
Health & safety	6	% reduction in accidents (Zero accident ports)	-	100% (by 2023)

1. National level target, since port level target can vary basis land availability, soil fertility etc.
2. Current measure based on 4 Major Ports: Mormugao, Paradip, Cochin and New Mangalore
3. Current measure based on 3 Major Ports: Mormugao, Paradip, and Cochin

Source: Annual reports of leading international ports, domestic private ports, Portopia KPI analysis, PRISM report, TA 12 Report, 4 Indian ports

CHAPTER 10

Become Top Seafaring Nation with World Class Education, Research and Training

Become Top Seafaring Nation with World Class Education, Research and Training

10.1 Current landscape

India currently contributes to 10-12% of world seafarers, leaving significant untapped potential. The market is currently dominated by countries like Philippines, Indonesia, Myanmar due to their higher expertise and lower costs. In order to compete globally it is important to establish institutions and develop up-to date programs for training and upskilling Indian seafarers.

At present, Indian Maritime education institutes do not feature among the top 25 institutes for ocean studies. In addition, the existing institutes have limited course options and partnerships with global industry players and universities restricting the student exposure. Similar development and innovation opportunities also exist on the research and innovation front too. Research and innovation are a vital component of the Maritime sector worldwide with countries like Norway and Singapore leading in this area. For instance, India has 42 research citations per million inhabitants compared to leading maritime nations who have over 2000[1] citations related to Maritime topics per million inhabitants.

In order to become a leader in maritime sector it is important to focus on skill development and encourage research and innovation in the sector. To this end, four key focus areas have been identified to facilitate India in becoming a top seafaring nation:

1. Promotion of research and innovation through setting up of maritime knowledge cluster and innovation labs
2. Strengthening maritime education and training through improvement in training programs and increasing opportunities for seafarers
3. Building a strong ecosystem for seafarers focussing on welfare, grievance redressal
4. Encourage port led capability development

10.2 Promoting research and innovation

Maritime industry is evolving with more efficient ships, technologies and processes. As a result, capabilities required for onshore operations are also changing to computer science, marine electronics, etc. To cater to the changing demand, India needs to enhance maritime research and education in areas like marine geology, environmental science, etc. At present, Indian education and research institutes are operating independently, with limited industry collaborations which reduces the go-to-market expertise that is offered in competing global education institutes. For instance, Norway has established knowledge cluster to co-ordinate and enhance research in partnership with industry and global universities, which promotes domestic maritime research and fosters industry collaborations (Exhibit 10.1).

Initiative 10.1: Establish Maritime Knowledge Cluster to drive coordinated and collaborative research

India needs to drive collaboration across National Technology Centre for Ports, Waterways and Coasts (NTCPWC), Centre for Inland and Coastal Maritime Technology (CICMT), National Institute of Oceanography (NIO), and Indian Maritime Universities (IMUs) for strategic maritime research.

Indian maritime knowledge cluster to focus on:

1. Enhancing research and development (R&D) capacities at IMUs/MTIs
2. Focused research across strategic topics
3. Onboarding 10+ industry players across 5 research thrusts of ports, ship-building, dredging and logistics industries
4. Creating a taskforce under Indian Maritime Center to drive collaboration across domestic/international network (Exhibit 10.2)

Additionally, steps to promote and partner with all public/ private shipyards, ports and logistics service providers (LSPs) to offer customized skill development courses for becoming the best high-end training / upskilling partner for marine / Port sector workers should also be evaluated.

1 TA discussion

Exhibit 10.1 | Development of Maritime Knowledge Cluster in Norway

Maritime knowledge cluster in partnership with global institutes and industry

Maritime Knowledge hub & infrastructure

- 9+ universities specializing in niche maritime topics
- 10+ robust industries linkages
- Presence of 5 international universities

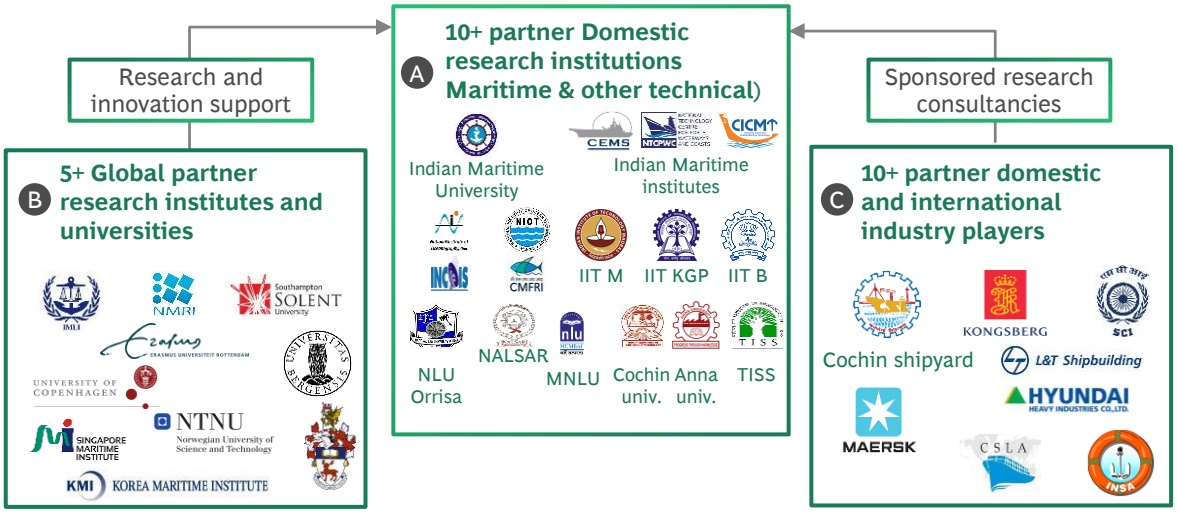
Norway cluster working on 5 areas
Efficient Energy
LNG
Demanding maritime operations
Innovation and maritime business development
Arctic transport and operations

Cluster works together to develop innovative ideas for the maritime sector

- **Host camps and networking events** to present research on predesignated topics
- **Cluster board** acts an institution for collaboration by facilitating knowledge linkages, managing government relationships, global brand building, etc.
- **Attract world class talent** to undertake research projects through grants
- Creation of a **Ocean Space Centre at NTNU** acting as the centre of gravity of the knowledge cluster by undertaking innovation testing and implementation

3 Key components of Knowledge Cluster: 1. Promotion of domestic research, 2. International universities collaboration and 3. Industry partnerships

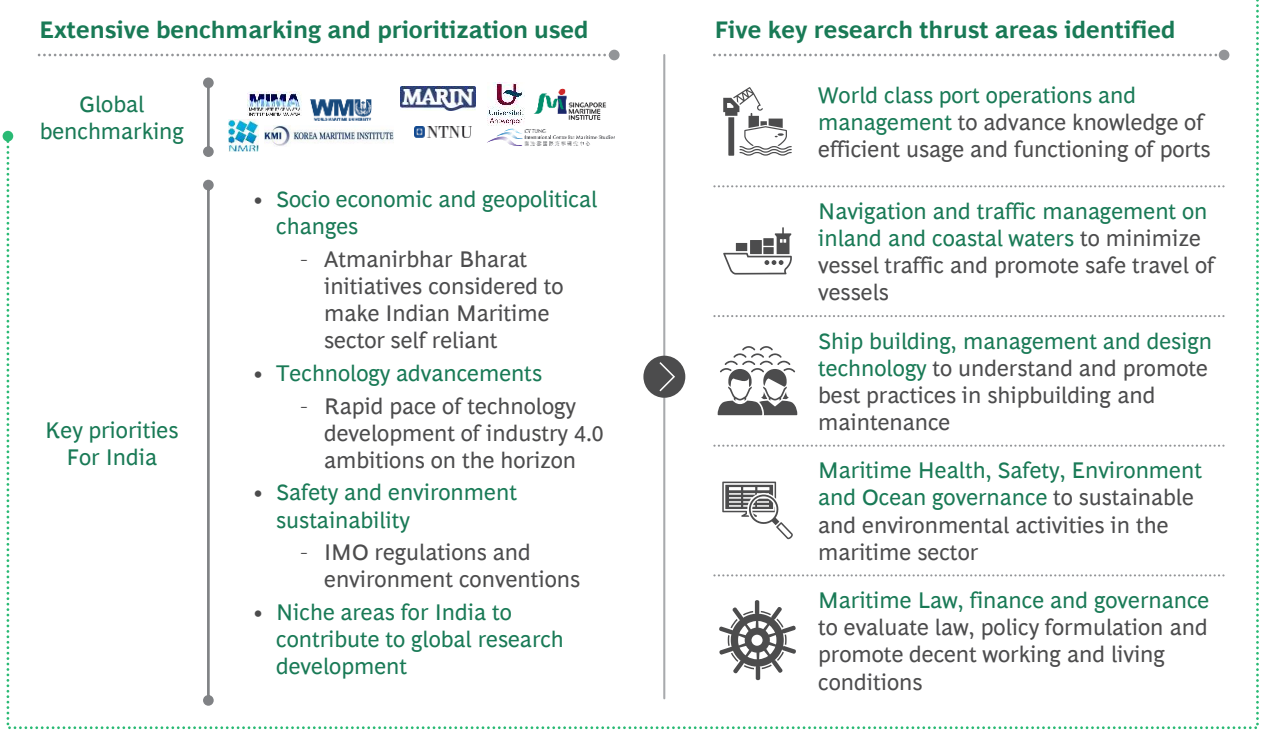
Exhibit 10.2 | Coordinated promotion and development of proposed maritime knowledge cluster



Coordinated by a task force under Maritime Apex body

The proposed knowledge cluster should assess priority research on five key subjects which have been prioritized though global benchmarking and India's priority requirement (Exhibit 10.3).

Exhibit 10.3 | Key research thrust areas to be prioritized by proposed knowledge cluster



It is important to keep pace with the changing environment of the industry including ports, shipping, offshore and marine engineering, etc. Collaborative participation by R&D community, technology developers and start-up community are needed to develop an enabling innovation environment.

Initiative 10.2: Drive research innovation and technology commercialization through establishing a living lab facility in partnership with NTCPWC & CICMT with a Major port

Singapore has successfully established a living lab, which focuses on four key areas including innovative infrastructure, data analytics, security and automation (Exhibit 10.4). Setting up of a living lab facility at major port with physical test-beds at sea should be evaluated. The proposed facility should be in collaboration with NTCPWC, CICMT and IMU at one of the three key Major ports (JNPT, Vishakapatnam and Chennai). Additionally, setting up a National Marine Incubation Cell should be assessed by expanding Sagarmala Start-up and Innovation Initiative. The proposed cell would offer institutional, infrastructure and financial support through industry-wide acceleration program for port and maritime industry start-ups.

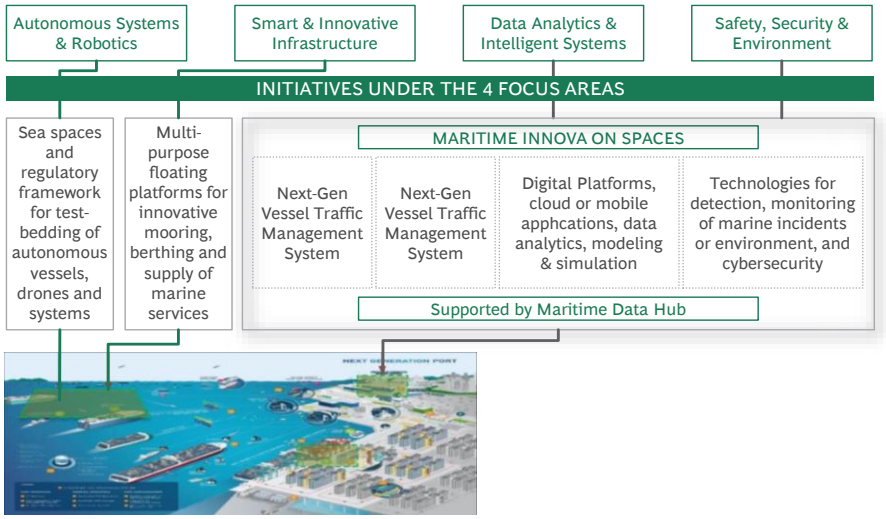
The above-mentioned facility and incubation cell should encourage collaborative action of various industry stakeholders like process owners, technology providers, start-ups and/or researchers and offer platform to co-innovate, test-bed new systems, and bring technological and engineering solutions closer to market.

Initiative 10.3: Knowledge cluster to deliberate and publish on strategic goals set by International Maritime Organisation (IMO) and create base documents for the 5 shadow and 7 base shadow committees in line with IMO committee structure

As a part of the proposed knowledge cluster a DGS IMO Cell should be created with a core committee to constitute and co-ordinate activities of 12 shadow committees. The 12 shadow committees and base-shadow committees should be set up with relevant industry members and experts in line with IMO committee structure with competent and relevant stakeholders.

Exhibit 10.4 | Singapore's maritime Innovation Lab

Four focus areas for developing innovative solutions for the Maritime sector



Key characteristics of the MPA living lab in Singapore

Physical and digital spaces serving as a cooperation platform between industry, research institutions, technology providers, etc.

Set up as a innovation and trial center for projects such as, traffic management, wireless communications, port technologies, etc.

10.3 Strengthening Maritime Education and Training

Strengthening of the maritime education and training facilities would help in improving the quality of Indian seafarers. While India's global share in seafarers has grown manifold in the last few years there is rising competition, especially from South East Asian countries, which are highly cost competitive. In order to increase India's, share four key pillars have been identified in Exhibit 10.5

Exhibit 10.5 | Four key pillars to enhance India's share of Seafarers

1 Enhancement of quality of maritime training	2 Improved On-Board training opportunities and Placements	3 Promotion of Careers at Sea	4 Seafarer welfare and attractive alternative career opportunities
Standardized entrance test to ensure quality candidates	Increased Indian Tonnage and Mainline calls in India (through Transshipment hub)	Re-invigorate thrust in Seafaring by marketing campaigns: Success stories in career fairs/and digital media	Professional development courses with flexible learning mechanisms
Redesigned curriculum with new-age courses, e-Learning and digital technologies	Increase training opportunities (mandate requirement on foreign ships)	Training Academies and Centers at key Seafarer producing areas: Valsad, Ratnagiri, Minicoy	Offer seafarer welfare facilities and counselling
Faculty development programs and leverage visiting faculty	Increasing global awareness & drive Bilateral agreements with major Ship owning countries	Scholarships/ benefits to women candidates	Defined alternative career paths and upskilling options
Dedicated training in hospitality for cruises			

Initiative 10.4: Strengthen Maritime university curriculum through introduction of new dual-degree and co-branded courses in new emerging topics/technologies as well as offering additional course formats such as short-term professional development certificate courses/ online credit accumulation for Seafarers

Maritime university curriculum could be strengthened through improvement in curriculum by introducing dual degree courses (Exhibit 10.6), offering co-branded and professional development and upskilling courses. Additionally, credit accumulation mechanism could also be introduced in line with global practice which provides flexibility to seafarers to complete credits through both online/ offline mode.

Exhibit 10.6 | Introduction on new courses incorporating expanding areas of maritime education

1 Creation of 5 dual degree courses for seafarers and ship design

Creation of dual-degree Marine and Non-marine courses to ensure STCW requirements and develop blue economy

	Marine engineering	Nautical science	Naval architecture
Computer science	✓	✓	✓
Marine electronics	✓	✓	

2 Creation of 5 UG and PG courses to develop blue economy

Examples: Courses on Oceanography, Marine geology. Marine environmental science etc.

Way forward

10+ new courses to be launched across IMUs over next 2-3 years

Additional dynamic courses to be re-evaluated post 2025 basis industry requirement

Other steps to improve maritime education

Faculty development

Global partnerships

Developing centres of Excellence

Exhibit 10.7 | Proposed Professional Development and Collaborative Courses

Maritime training institutes to design, develop and deliver PDCs

1. **Professional development courses (Officers):**
   - Invite industry specialists and experienced seafarers to regularly upskill students
   - Subjects: Communication systems, Maritime Management
2. **Professional development courses(Ratings):**
   - Subjects: Soft skill enhancement, Catering, hospitality and onboard services

Collaborate with WMU for courses in Maritime Law, Logistics & Management

Maritime Administration & policy
- WMU along with Maharashtra National Law University to offer an MPhil in Maritime law

Maritime Logistics
- WMU in collaboration with IMU to offer a MSc in Maritime logistics and transportation

Maritime Ocean governance
- WMU in collaboration with IIT Chennai (NTCPWC) to offer a MSc in Ocean Governance

Maritime management
- University of OSLO in collaboration with GMU/IMU

Exhibit 10.8: Suggested Digital Tools for Examinations

Exam wise suggestions

Categories	Course or Examination	Duration in months	Final Examining Authority	Single Authority Final examination	Single Authority Exit Examination	Theory Examination: 1 S (Subj+/-Obj.) / O (Only Obj.)	Theory Examination: 2 Hardware used for theory examinations	Oral exams: 3 Viva>>Viva/ Video based oral exam	Oral exams: 3 Simulator Based examinations
Pre Sea	ETO	4	MTI>> BES	No>>Yes	No>>Yes	S>>O	Paper>>Computer	APC	No
	Ratings	6	BES	Yes	Yes	O	Computer	Yes	No
	GME	12	MTI>> BES	No>>Yes	No>>Yes	S; S>>O (II)	Paper>>Tab>> Comp	APC	APC
	DNS	12	University	Yes	NA	S; Sugg. S>> O (III)	Sugg. Paper>>Tablet>> Comp	APC	APC
	DME	24	MTI>> BES	No>>Yes	No>>Yes	S; S>>O (II)	Paper>>Tab>> Comp	APC	APC
	NS	36	University	Yes	NA	S; Sugg. S>> O (III)	Sugg. Paper>>Tablet>> Comp	APC	APC
	ME	48	University	Yes	NA	S; Sugg. S>> O (III)	Sugg. Paper>>Tablet>> Comp	APC	APC
Modular	STCW Modular	2d to 2w	MTI/DGS	No/Yes	Some	S/O>>O	Paper/Comp>> Comp	No	Some
Preparatory	NCV	2 to 6	MTI	No	No	S>>O (III)	Paper>>Tab>> Comp	No>>Mock	No
	Class II	4	MTI	No	No	S>>O (III)	Paper>>Tab>> Comp	No>>Mock	No
	Class I	2	MTI	No	No	S>>O (III)	Paper>>Tab>> Comp	No>>Mock	No
	2nd mate	4	MTI	No	No	S>>O (III)	Paper>>Tab>> Comp	No>>Mock	No
	1st Mates Phase I	3	MTI	No	No	S>>O (III)	Paper>>Tab>> Comp	No>>Mock	No
	1st Mates Phase II	3	MTI	No	No	S>>O (III)	Paper>>Tab>> Comp	No>>Mock	No
	ASM	1.5	MTI	No	No	S>>O (III)	Paper>>Tab>> Comp	No>>Mock	No
COC/COP Examination	NCV Nautical	0	MMD	Yes	Yes	S>>O (III)	Paper>>Tab>> Comp	Yes	No>>Yes
	NCV Engineering	0	MMD	Yes	Yes	S>>O (III)	Tablet by IMEI>>Comp	Yes	No>>Yes
	ETO	0	MMD	Yes	Yes	S>>O (III)	Paper>Tablet WIP>>Comp	Yes	No>>Yes
	MEO Class IV	0	MMD	Yes	Yes	O improve	Computer	Yes	No>>Yes
	MEO Class II	0	MMD	Yes	Yes	S>>O (III)	Paper>Tablet WIP>>Comp	Yes	No>>Yes
	MEO Class I	0	MMD	Yes	Yes	S>>O (III)	Paper>Tablet WIP>>Comp	Yes	No>>Yes
	GMDSS Radio Op.	0	MOC	Yes	Yes	S>>O (III)	Paper>>Tablet>> Comp	Yes	Yes
	2nd mate	0	MMD	Yes	Yes	S>>O (III)	Paper>Tablet WIP>>Comp	Yes	No>>Yes
	1st Mate	0	MMD	Yes	Yes	S>>O (III)	Paper>Tablet WIP>>Comp	Yes	No>>Yes
	Master	0	MMD	Yes	Yes	S>>O (III)	Paper>Tablet WIP>>Comp	Yes	No>>Yes

Opportunity area to implement recommendation

1 Objective based testing 2 Online based training 3 Simulator based training

Source- TA 13 group discussions

In addition to offering new courses, collaborations with foreign universities could be established to offer specializations like maritime law, maritime management, etc. Further, professional development courses to upskill working professionals should also be explored (Exhibit 10.7). It is estimated that 6 out of 10 mid-level professionals are upskilling. It is important to understand their needs and offer suitable courses.

Initiative 10.5: Upgradation of admission process, technology, assessment and evaluation techniques

In order to upgrade and streamline the admissions process a common entrance examination should be developed. Furthermore, deployment of digital tools should also be apprised for making the admission process more competitive (Exhibit 10.8).

While it is important to introduce new courses and admission processes, it is equally important to train the maritime faculty and encourage out of the box innovative thinking.

Initiative 10.6: Strengthen faculty network across Maritime education and training institutes through establishing Faculty Development Program

Five key areas of action have been identified for faculty development and training including faculty development program and faculty exchange programs (Exhibit 10.9).

Initiative 10.7: Drive academic partnerships with more than 10 leading foreign maritime universities

Academic partnerships with top tier school can provide several benefits like enhancement of brand and credibility, access to would class faculty, exchange program for student, curriculum design and pedagogy sharing and administrative support. This is crucial for scaling up of an institute. Possible formats for global collaboration have been given in Exhibit 10.10

Initiative 10.8: Improve job opportunities for Indian seafarers by driving increased onboard training slots

There has been a continuous increase in Indian cadets since 2016, however the existing berths are not enough to provide speedy training. Therefore, opportunities to train Indian seafarers on foreign flagged vessels should be evaluated. Training capacity should be a minimum of 1.5 trainees for every 10 persons on board vessel for number of days vessel is in-chartered. Further a monitoring mechanism should be put in place for ensuring compliance and overlooking the training institutes.

Exhibit 10.9 | Areas to promote and develop maritime faculty

	Areas for intervention	Details
Resident faculty	**Faculty Development program**	• Customize upfront training for faculty in partnership with NITTTR Chennai and Teacher Training facility at IIT Madras • Encourage faculty to undertake further studies through allowing concurrent MS (by research) followed by PHD
	Continuous Education	• Institutionalize short-term Professional Development / Certifications for upskilling faculty through higher education institutes (IIM, IITs) • Bi-annual participation in international conferences and training programs
	Research Linked Career Progression	• Establish research-linked career progression (specific research targets for publication in Q1 journals)
Visiting faculty	**Faculty exchange programs**	• Leverage academic partnerships with global institutes for faculty exchange programs for short period of time
	Leverage visiting faculty	• Marine related- invite industry experts to train faculty and take classes • Non-Marine related- invite professors from domestic universities such as IIT

Note: NITTTR- National Institute of Technical Teachers' Training and Research

Exhibit 10.10 | Partnership model with foreign universities

	1 Programmatic collaborations	2 Affiliation	3 Satellite Campus
Description	Loose collaboration across a variety of programs/ topics – for each with different universities Often accompanied with faculty exchanges , Degrees remain distinct Partner brand leverages for marketing/ PR	Co-certified degrees with high influence of partner on curriculum/pedagogy Also often accompanied with faculty exchanges; stronger experience sharing etc.	Campus of a global school with a local partner; same curriculum/pedagogy Shared faculty pool; also often shared non academic staff and expertise Same degree offered
Examples	IIM Bangalore provide dual degree courses		NYU have campuses in Shanghai and Abu Dhabi
Proposed partnerships			Target Campus of European universities in India
	Short and medium term	**Short and medium term**	**Long term**

Steps should also be undertaken to enhance the employment opportunities for Indian seafarers through improvement of global maritime stature and leveraging Ministry of External Affairs (MEA). At present, 92% of India's overseas trade is carried on foreign flagged vessels, which limits available employment opportunities (Exhibit 10.11).

Initiative 10.9: Digitize and upgrade CoC assessment mechanism of seafarers through end-end digitization of evaluation, assessment and certification process

Over the past few years, Philippines has captured significant share in sea farer market (approximately 25% of the global market). One of the key factors in success was the digitization of the certification program. Similar to Philippines (Exhibit 10.12), digitalization initiative in assessment and certification should be evaluated in India, which would significantly increase the ease of access for the seafarers (Exhibit 10.13).

Initiative 10.10: Re-orient and develop existing IMU campuses as 6 Centre of Excellences (CoEs) with specialized domains and enhanced industry collaboration and partnerships with specialized global institutes

Due to their sector expertise, IMUs may be given a greater role in Maritime Education. IMU have acquired expertise and infrastructure in specific disciplines such as marine engineering, nautical science, maritime management and naval architecture. To further achieve success, it is required to set up CoEs at each campus's basis their specialty. Setting up of CoE may be evaluated at the following locations:

- Vishakapatnam—Naval architecture
- Chennai campus—Maritime management
- Chennai HQ—Research and PhD – Marine Engineering, Dredging, port engineering, Ocean technology, Inland waterways, Marine occupational Health and safety
- Kolkata—Marine engineering
- Mumbai—Nautical science
- Kochi—Maritime Law

These CoEs would create support for basic and advanced strategic research, help in development of an ecosystem connecting research across disciplines both domestically and internationally and bridge gap between the researchers and users generating a robust industry-academia- government link.

Exhibit 10.11 | Levers to enhance job opportunities for seafarers

Enhance job opportunity for main fleet and offshore sector

Increased awareness:
- Increase awareness of capability and availability of seafarers within international community

Home porting by cruise-lines:
- Attract foreign cruise lines to develop Indian ports like Mumbai, Mormugao, Cochin as Home ports

Leverage MEA to promote Indian seafarers to foreign ship owners

Conduct visits by Indian delegation to large ship-owning countries on a regular basis with co-ordination from Indian Missions abroad

Request for training berths

Prioritize countries such as Russia, Japan, Korea with high ship ownerships

Improve global stature through conferences and delegations

Host International conferences:
- Organize shipping conferences on Manning and training involving shipowners from all countries
- Invite shipowner representatives to display world class training facilities in select MTIs

Improve Indian delegation:
- Improve visibility of Indian delegations to IMO, ILO, WHO through increased participation of industry representatives
- Establish permanent representative in IMO and ILO

Exhibit 10.12 | Philippines' Digitalization Initiative for Seafarer Certification Program

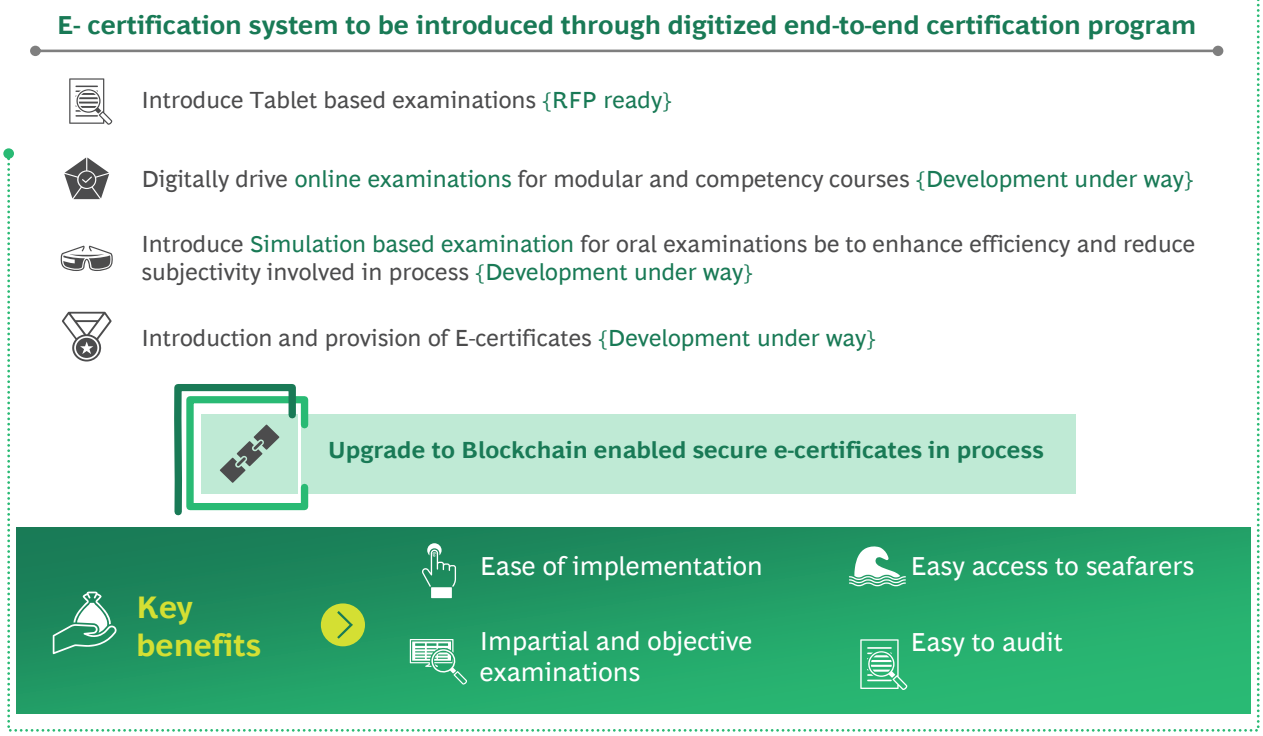
Standardized Training Requirements: Developed standard Maritime Education and Training (MET) program in partnership with technical & industry experts (Ship Owners / Mgt. Companies)

Stringent Accreditation for MTIs: Launched Surveillance, Accreditation and Monitoring-Information System (SAM-IS) to regulate minimum quality of MTIs

E- certification System: Digitized end-to-end certification program
- Qbank: E-system to digitize and track documentation of theoretical exam questions
- MCAS (MARINA Competency Assessment System): Conduct and assess examinations
- MISMO (MARINA Integrated Seafarers' Management Online System): Digital platform to issue e-certificates

Upgrade to Blockchain enabled secure e-certificates in process

Exhibit 10.13 | Proposed Digital and Simulation Based Examinations



Initiative 10.11: Implement training schemes and programs for coastal communities to enhance skills, capabilities and safety

A holistic training program for coastal community should be developed. Key focus areas for developing a training program for coastal community would include:

- Create a framework maritime training related and certification system with the help of the DGs
- Facilitate recruitment of candidates in the industry through qualifications that are in line with approved Skill development courses in maritime industry
- Identify framework for funding and monitoring training facilities in coastal communities
- Leverage the schemes of Ministry of Skill Development and National Skill Development Corporation (NSDC) for skill development in Maritime industry
- Refine the administrative structure to implement at district level as a national mission
- Create a national register of all candidates after training to generate a common platform for employers and employees

The deep sea fishing community is currently facing issues due to limited technology expertise (a large number of vessels lack basic communication and navigation aids), improper training (limited understanding of shipping lanes and international guidelines) and lack of financial support (limited availability of finance for capital investment)

Initiative 10.12: Develop a training scheme for fisherman in deep sea fishing vessels undertaken as a joint initiative of Ministry of Ports, Shipping and Waterways and department of fisheries

Development of a training program focusing on needs of fishermen should be evaluated. The program should include details on emerging technology, compliance to shipping lanes, international boundaries and management (Exhibit 10.14).

Initiative 10.13: Develop a Scheme for Coastal Community Development through creation of training centres to promote the blue economy in India

Currently, most states are providing a two-week training programme for persons working on fishing trawlers. But such short-term training will not yield the desired results as a minimum of 180 hours of training is required to make a person familiar with the procedures to be followed to handle the boat in rough seas and in case of

Exhibit 10.14 | Training to enhance skills of Deep-Sea Fishing Community

2 key areas of development	Process of developing deep sea fishing for Indian fishermen
Technology upgradation (Ministry of Ports, Shipping and Waterways and Dept. of fisheries)	• Collaborate with ISRO to develop NaVIC system a home grown GPS system • Construct mobile towers to enhance communication and GPS tracking abilities up to 15 nautical miles from the coast • Modern state of art of technology of data sciences and AI to disburse information such as resource maps, potential fishing zones and tracking of deep sea fish • Develop a fisheries management system providing accurate information on deep sea fishing, resource management, etc • Develop partnerships between the industry and leading academic institutions to develop low cost marine broadband framework to provide wireless communication
Training and development of fishermen	• Set up a center of excellence with a special emphasis on the deep sea fishing sector • Conduct high quality training for a the fishing industry with a special focus on emerging technologies • Conduct R&D on deep sea fishing technologies and best techniques • Simulation based training centers for the training and development of manpower in modern fishing techniques, navigation of fishing vessels • Special focus to training and compliance of fishing lines, shipping lines and international water boundaries • Provide short term courses on administration and management topics for fishermen

an emergency. Specialised training institutes should be established for skilling, upskilling and cross skilling for the areas identified as required by fishing activities & the development of coastal communities. Key focus areas of these training centres would include navigation, fishing, development of blue economy, marine renewable energy, marine manufacturing, etc.

Initiative 10.14: Establish & promote 4 new full-fledged domestic IMU campuses across Gujarat, Karnataka, Odisha, North-East and additional 5 satellite international campuses

India needs to establish 4 domestic IMU campuses in Gujarat, Karnataka, Odisha and North-East In addition to this, engagement with potential BIMSTEC countries, Mauritius and other African countries to be pursued for establishment of 5 satellite international campuses.

10.4 Building a strong ecosystem for seafarers

In order to nurture world-class seafarers, it is necessary to develop a strong ecosystem encouraging participation of women, developing an effective e-governance and recruitment system to increase ease of access for seafarers and improve transparency. Taipei is a good example of building the required ecosystem and has been showcased in Information Box 10.1

Initiative 10.15: Launch 'Women in seafarer' program

At present, women have only 0.5%[2] share in onboard seafarers in India. The lack of participation is mainly due to limited knowledge of this career opportunity, lack of incentivisation from shipping lines and cultural bias. To address this issue an awareness campaign should be started to publicize the success stories of women seafarers and inform of available opportunities. In addition to this, onboard gender sensitization should be encouraged, and onboarding buddy program should be launched (Exhibit 10.15).

In order to develop a holistic ecosystem, it is important to ensure the wellbeing of seafarers. At present, there is limited awareness and knowledge about the mental well-being of seafarers. This should be addressed through establishment of port welfare committees.

2 TA discussions

Information Box 10.1 | Global Example of Increasing Women Participation in Seafarers

Taipei has achieved a significant women participation in seafarers through active marketing and implementation of a recruitment mandate. As a result, the share of women seafarers has reached over 3.5% against a global average of about 2%

Gender Equality Education Act (2019): Introduction of act to provide fair opportunities for participation in MET for women

Marketing and promotion: Active usage of media to promote women seafarers through micro movies, press conferences

CSR: Chinese Taipei shipping companies employ women seafarers as a part of their CSR

Specialized programs: Introduction of gender diversity programs to raise awareness

Recruitment Mandate: State owned shipping companies are required to recruit female nautical candidates

Chinese Taipei has increased share of women seafarers to ~3.5% share of national seafarers vs.~2% global average

Exhibit 10.15 | Women in Seafarer Program to Increase Women Participation

Launch 'Women in seafarer' program

Awareness and Marketing:
- Increase awareness regarding women seafarer roles through career counselling / marketing campaigns
- Publicize women seafarer success stories to improve sentiment

Incentivization:
- Supply: Leverage scholarships and promote participation through waving tuition fees
- Demand: Evaluate mandating domestic shipping companies to hire women seafarers

Promote gender sensitization and zero tolerance gender discrimination

For Seafarers onshore, launch buddy program and counselling support if needed

Initiative 10.16: Establish Port Welfare Committee (PWC) across all ports promote mental wellbeing of seafarers

A two-pronged approach should be evaluated to tackle the mental health hazards faced by the seafarers. This includes establishment of a port welfare committee and promotion of a continuous welfare program (Exhibit 10.16).

Recruitment is the starting point of seafarer's journey, and it is important to ensure a transparent and simple process is followed for the same. At present, the recruitment process is largely non-digitized making monitoring of recruitment and placement services licensing (RPSL) systems difficult and ineffective.

Exhibit 10.16 | Approach to Ensure Seafarer's Welfare

Two pronged approach to tackle mental health hazards faced by seafarers

1 Establish Port Welfare Committee (PWC) across all ports

- Set up seafarer shore-based welfare centers at ports with:
  - Medical support and comfort facilities to seafarers
  - Provision of recreational facilities
- Reciprocate the success at Deendayal port across all ports in India

2 Promote mental well-being of Seafarers

- Pre screening of aspirants prior entering in maritime colleges
- Sensitise and awareness on mental health and physical health of seafarers while they are in maritime college
- Encourage shipping companies to have mental health policy
- Maritime administration to provide standards of tests for seafarers prior joining college / ship
- Seafarers to get educated on identifying sign / symptoms and how to promote wellbeing on board with colleagues

Continuous welfare program: DGS to tie-up with TISS (Tata Institute of Social Sciences) for on-call 24*7 counselling sessions and mental wellness programs

Initiative 10.17: Modernize and digitize Recruitment and placement licensing system and implement stringent governance to regulate and improve functioning of RPSLs

At present the seafarers have six means for reporting grievances with government of India including Online Redressal by GDS, DGCOM Mumbai vide DG(s), Centralized Public Grievance Redress and Monitoring System (CPGRAMS), MEA, E- migrate grievance system and National Human Rights Commission (NHRC). However, the mechanism becomes ineffective as ships can face connectivity issues.

Three key levers have been identified for strengthening the existing RPSLs and making the recruitment process more transparent (Exhibit 10.17).

Initiative 10.18: Build online system for grievance redressal and complaint registration with regular monitoring to have timely redressal of grievances basis clear SOP

The following initiatives should be evaluated to establish an accessible grievance redressal mechanism

- DG(s) to take up with MoPSW and MEA to appoint a Second Secretary level officer to look into grievances of seafarers
- Implement clear SOP on handling complaints – to be available on DG(s) website
- Incorporate chat based online system
- Seafarers to get updated information on progress of their complaint filed through SMS and email registered at e-governance cell
- Build welfare desk, preferably at LRIT office- to exclusively handle calls from seafarers and direct them to concerned person

Exhibit 10.17 | Levers to Strengthen Existing RPSLs

Key levers to strengthen existing RPSLs

1 **Modernise and digitise system to make RPSL process transparent**

2 **Launch Governance mechanism with regular monitoring of following KPIs**

- # of seafarers employed every year (M/F)
- # of seafarers employed by rank wise across different ship type
- # of Seafarer days employed in a calendar year
- # of trainee seafarers employed in a calendar year (M/F)
- #of trainees inducted without pre-sea training and number of trainees inducted from Non DGS approved MTIs
- # of Grievance lodged by Seafarers against RPS Agencies and types of Grievances as per DGS system
- # of seafarers employed with Indian Lic/COP vs. number of Indian seafarers employed with foreign Lic/COP

3 **E-Register for Seafarers at RPS Agency be made compulsory**

Initiative 10.19: Participate and actively contribute in Seafarer Excellence Network in the Asia Pacific region to share Indian best-practices and benefit from global learnings

India should evaluate making a representation for membership in APAC Seafarer Excellence Network. Such networks/associations witness participation from countries having biggest seafaring population. Some of the key benefits of being associated with these associations would include exchange of professional human resources, sharing high-quality Maritime Education and Training (MET) infrastructures, manpower, funding and time, sharing best practises across issues such as welfare, career development, job transition, strengthening employability, capacity building and exchanging policy dialogues for enhancing procedural cooperation and interaction.

Initiative 10.20: Create a common platform between DGS and Global Maritime Distress and Safety System (GMDSS) to provide GMDSS tracking facility to seafarers to avoid fake certification

At present, there is no tracking system of GMDSS certification application regarding status of approval/ rejection. Moreover, the existing website often faces delays in updating the status of application. Implementation of online GMDSS tracking system via national society of professional surveyors (NSPS) should be evaluated to DG(s) website. This would facilitate sharing and tracking of issuance/ renewal of GMDSS certifications. Digitalisation would facilitate avoidance of fake certification, provide updated records of GMDSS GOC certificates and ensure higher utilisation of Indian GMDSS certification.

Initiative 10.21: Extend social benefits like provident fund, gratuity and pension to all seafarer ranks

Provisions to provide social securities like provident fund, gratuity and pension to all the sea farer ranks should be evaluated. Additionally, mechanism to extend voting rights to onboard seafarers should also be appraised.

Initiative 10.22: Streamline process of crew change at ports through digitization of clearances and customs

There is an absence of best-in-class SOP for ship masters / port customs & immigration officers' hassle-free crew exchange procedures. This leads to difficulty in handling customs & immigration procedures with significant amount of paperwork. Digitalisation of crew clearances and customs through online forms to streamline the crew change process should be evaluated. Biometric

collection of seafarers to bring in transparency and single point contact for all change queries should be established.

Initiative 10.23: Prepare and submit a white paper to International Labour Organisation (ILO) for consideration of e-visa on arrival for Indian seafarer at EU countries, Australia, Russia, Argentina, Canada, USA, New Zealand and Romania

Indian seafarers are not able to get e-visa at many countries. This creates logistics issues and impacts costs for a shipping company during crew exchange. Long duration to obtain visa through consulate also proves to be hindrance for joining onboard vessel at a short duration. A White Paper submission to ILO should be evaluated recommending all member states to give e-visa too all Seafarers carrying seafarer identity document (SID) card under SID convention 2003, as amended. E-visa facility is likely to increase the ease of crew exchange thereby increasing employment opportunities and save cost and time.

10.5 Port led capability development

Initiative 10.24: Institutionalize identified reward categories and develop an implementation roadmap (in phases) across maritime stakeholders (ports, coastal & inland, shipping, etc.)

For encouraging capability development and target behaviours, awards and recognitions could be defined across four key categories – ports, shipping, coastal and inland and state-level awards (Exhibit 10.18).

Initiative 10.25: Enable Major Port trusts to recruit talent for leadership positions from private sector through amendment in existing recruitment provisions & enhancing salary competitiveness

Major ports should explore recruiting talent from private sector. A similar initiative was undertaken by Niti Aayog and SBI, which have witnessed improvement in performance (Exhibit 10.19).

Initiative 10.26: Refine organization structure for port trusts to drive concession management under landlord model and port led industrialization

Due to varying business objectives and context, customized organization structures need to be developed for all major ports. The structure should be a combination of must haves and port-specific functions basis the port archetype and business context (Exhibit 10.20).

Initiative 10.27: Enhance training & skill development of port employees

Four key interventions have been identified to enhance the training and skill development of port employees in line with move towards landlord model (Exhibit 10.21). Also, Ports to define a structured training program for various classes of employees.

Exhibit 10.18: Award categories for capability development & recognition

Category	Proposed Awards	Illustrative key criteria
Ports	Excellence in overall performance of the port	• Avg. TRT (30% weightage) - % difference from best in class: 1 day for Container, 2 Days for Bulk/Liquid • Growth/ Demand creation (30%) - % Growth in Cargo • Safety (20% weightage) - # Number of accidents • Sustainability (20% weightage) - # MW from renewable
	Excellence in terminal operations (Pvt. terminals)	• Avg. TRT (30% weightage) - % difference from best in class: 1 day for Container • Growth/ Demand creation (30%) - % Growth in Cargo • Safety (20% weightage) - # Number of accidents • Sustainability (20% weightage) - # MW from renewable
	Excellence in application and innovation in e-governance	• Case study highlighting the innovation implemented in the year and the benefits accrued to trade port: - Cost and time saved for customer - Cost saved for Port
	Outstanding clean and green port	• Sanitation, cleanliness and get up - To be scored by a visiting team for each part (admin building, berths, yard, etc.) • Practices for handling dirty cargo - % manual handling (dirty cargo) - Use of sprinklers, automated moisture mgmt., use of hoppers for dumper discharge, etc. • Green energy use - # MW from Renewable energy
Shipping	Best performer for the year in Shipping operations (Indian)	• Growth/ Demand creation (30%) - % Growth in Cargo • Financial Performance - % increase in profitability • Safety performance - # Number of accidents

Rewards and Recognition| Key award categories with evaluation criteria defined across maritime stakeholders; ports to institutionalize finalized awards

Category	Proposed Awards	Illustrative key criteria
Shipping	Excellence in Shipyard ops (Public and Pvt)	• Capacity added in tons (20%) • Gross tonnage of vessels delivered (20%) • % of vessels delivered on time (20%) • Net Additional to order back in FY (20%) • % improvement in productivity (20%)
	Excellence in ship repairs	• % increase in turnover from ship repairs • Foreign exchange earned/saved • Safety performance - # Number of accidents • % improvement in productivity
Coastal & inland	Excellence in coastal shipping	• Coastal volume carried in tons - % Growth in costal volumes
	Outstanding modal shift achiever	• Volume of modal shift cargo (MT)

Dedicated external body to Audit and run rewards in unbiased manner

Exhibit 10.19 | Inclusion of private sector in recruitment

Case in point	Key actions steps taken	Key potential benefits
NITI Aayog	• ~30% higher pay scale than the erstwhile professionals on payroll • Additional benefits provided such as accommodation allowances, transport allowance, medical benefits, CPF, EL, etc. • Minimum eligibility criteria established for each role such as min. 15 years' experience required for senior advisors • Reduced age limit for multiple positions e.g. min. age to 32 years from 40 years prescribed earlier for Planning Commission • Engagement for per-defined duration to measure the impact of private sector inclusion in day-to-day performance	• Congenial competition for jobs amongst officers and private sector applicants; leading to performance improvement and reducing legacy issues • Inclusion of private sector to drive performance-linked growth culture and ensuring brightest people work in public sector • Establishing a precedent and template for specialized skills and placement in areas of interest and aptitude • For example, Atal Innovation Mission (AIM), headed by a seasoned industry professional has become the catalyst for innovation, entrepreneurship and galvanizing the youth for a dynamic tomorrow
SBI	• Up to 3 per cent of annual profits distribution to staff in incentives to draw top talent from private sector • Offering stock options to employees above the rank of assistant/deputy general manager to attract private talent • Remuneration at prevailing market rates	• Specialized skills and capabilities incorporated across hierarchy such as wealth management, analytics, strategy, digital and customer services • Inclusion of private sector to drive performance-linked growth culture and ensuring best brightest people work for the development of India

Exhibit 10.20 | Customized organization structure for each port

	Small / Medium sized ports with primary focus on efficiency gain	Large ports with primary focus on traffic management and EoDB	Large ports with focus on industrial and ecosystem development
Common / "Must-have" functions	← • Strategic affairs and Data analytics • Port asset management • Harbour Master or Concession Management • Communication and External affairs	• Human Resources • Finance (treasury, book-keeping, etc.) • Procurement • Internal audit and Legal →	
Port-specific functions[1]	• Information technology • Business Development	• Digital business solutions • Warehouse Management • Hydrography services	• Land Management • Cruise management (if applicable) • Township Management

A Delegation of Power (DoP) matrix to be defined to improve efficiency across major ports

1. Functions mentioned are non-exhaustive

Source: Major ports data

Exhibit 10.21 | Interventions to enhance skill development of port employees

Simulation center-led training at ports

Setup of simulation centers in large container ports to enable effective crane education such as:

- Training operators in situations that can't be staged otherwise (e.g. weather conditions, etc.)
- Develop optimum running path b/w ship & shore

UNCTAD port management program

In collaboration with a leading Indian university, initiate UNCTAD program for Indian major ports to:

- Drive knowledge sharing & expertise among port managers
- Strengthen resources talent development in port communities

Intl. joint training / Human capital program

Collaborate with an international port or consortium to establish a joint training program to develop a new generation of port employees. For e.g.

- Port of Rotterdam's Human Port Capital program
- Port of Antwerp's Global Training institute

Vocational training / Hire & Train model

Collaborate with NSDC to conduct skill gap analysis & develop dedicated skill building framework for all ports

Design customized short term vocational courses to address semi skilled/ skilled jobs

Launch Hire & Train model in collaboration with corporate entities

10.6 Conclusions Summary

Development of best in class seafarers would require strengthening of maritime institutes which ensure dissemination of up to date knowledge and employment opportunities, encouraging participation of women, ensuring holistic development of seafarer community and initiating port led capability development.

As part of Vision 2030, targets have been defined to enhance the capability and skill development of seafarers (Exhibit 10.22).

Exhibit 10.22 | Key Performance Indicators for Capability Development

Capability development| KPI targets and impact

Category	KPI metric	Current	Target (2030)
Research and innovation	Number of research paper citations in the field of ocean sciences per million inhabitants	42	>2,000
	% of research undertaken with industry collaboration	<20%	60%
Maritime education and training	Indian universities in top 25 global ranking for Maritime science	-	3-5
	% contribution of Indian Seafarers across the world	12%	>20%
	% of proportion of women seafarers in India	<0.5%	2-3%

Source: Global Ocean Science report, published by United Nations Educations, Scientific and Cultural Org. (2017); Shanghai rankings

APPENDIX 1

Acknowledgement

Appendix 1: Acknowledgement

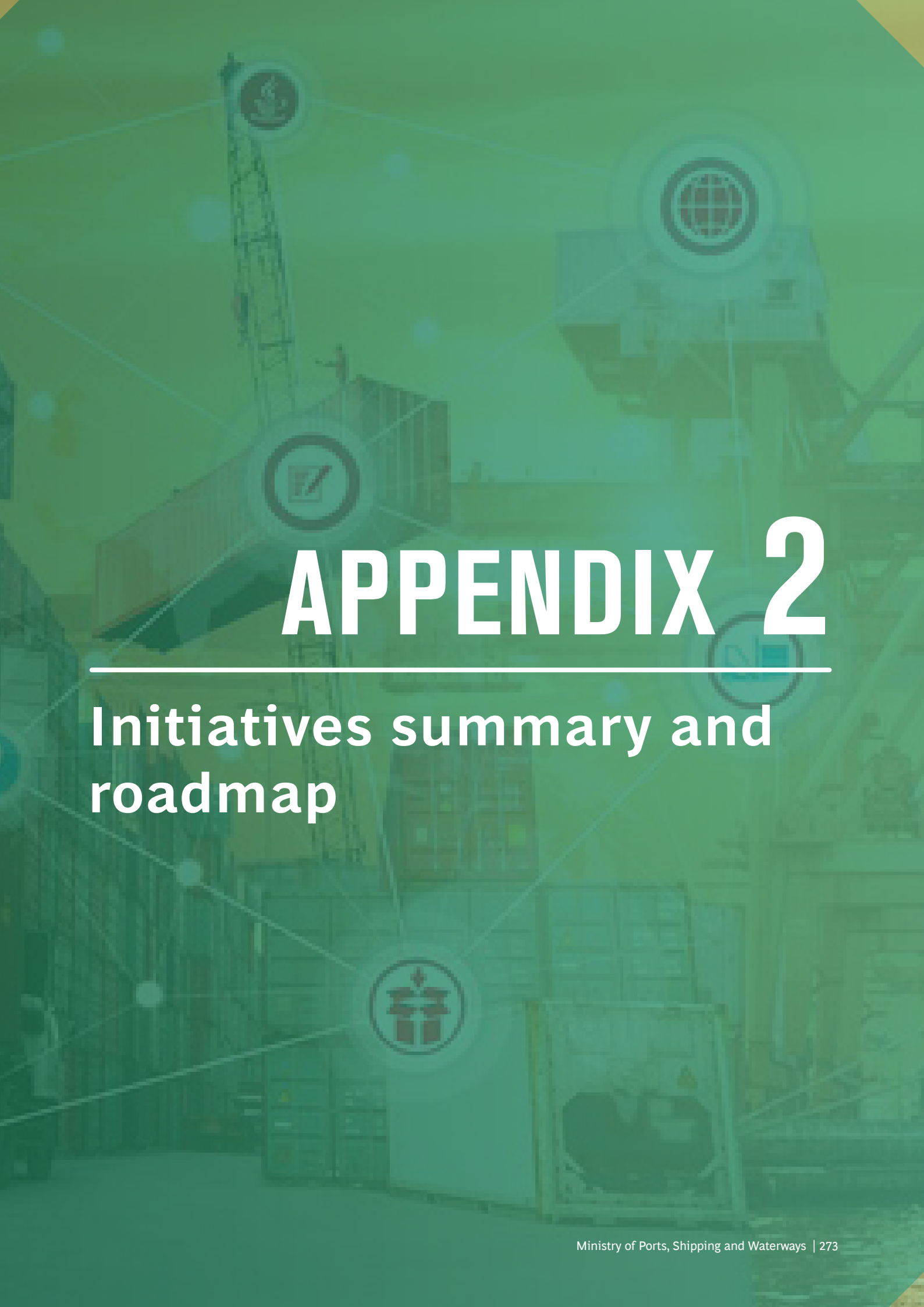
Under MIV 2030, over 350+ public and private sector stakeholders, comprising ports, shipyards, inland waterways, trade bodies and associations, national and international industry and legal experts, collaborated across 14 Thrust Area (TA) groups for topic specific discussions and recommendations. Committee members and industry experts across TAs were as follows:

Thrust areas (TAs)	TA Members
TA 1: Traffic Forecast, Capacity Planning and Resources Mobilization	All Major Ports Chairman and Deputy Chairman, Sh. Sunil Singh, Advisor TRW-MoPSW; Sh. D.K.Rai, Director (Sagarmala); Sh. D.K. Gupta, MD SDCL; Sh. Ragam Kishore, IPPTA; Sh. S.B. Shukla, IWAI; Sh. Sharad Sarangadharan, GMB; Mr. Ishwar Achanta, NSB; Mr. Rahool Panandikar (Oil & Gas expert); Mr. Sumit Gupta (Metals & Mining expert); and Mr. Vishal Mehta (Coal expert)
TA 2: Improve performance of ports to world class levels	Sh. Rinkesh Roy, Chairman PPT; Sh. Nandeesh Shukla, Dy. Chairman KPL; Sh. Unmesh Wagh, Dy. Chairman, JNPT; Sh. Sharad Sarangadharan, GMB; Sh. Anoop Agarwal, IPRCL; Sh. S Balaji Arunkumar, Dy. Chairman, KoPT; Mr. H N Ashwath; Dr. K Murali, NTCPWC; Prof. G Raghuram, IIM B; Dr. RD Tripathi; Mr. Abhijit Singh, IPA; Mr. Ishwar Achanta, NSB; Mr. Rajiv Agarwal; Mr. Ian Colotla and Mr. Jeffrey Chua (Port performance experts)
TA 3: Create new world class ports in India	Sh. Sanjay Sethi, Chairman JNPT; Sh. T.K. Ramachandran, Chairman VoCPT; Sh. K Rama Mohana Rao, Chairman, VPT; Sh. Sunil Paliwal, Chairman, KPL; Dr. Kumaran Raju, NTCPWC; Sh. Tarun Kumar, IME; Mr. Sudhir Kanvinde, IPA; Mr. Ennarasu Karunesan; Mr. Ishwar Achanta, NSB; Mr. D.K. Sen Sharma; Mr. Balasubramanian; Mr. N.P.R.K Reddy; Mr. Murali Kantharaj; Mr. Balwinder Sobti; Capt. Sandeep Mehta, Adani; Mr. Rizwan Soomar, DP World; Mr. Dinesh Khanna (Shipping Expert); and Mr. Saibal Chakraborty (Digital Transformation Expert)
TA 4: E-Governance in Maritime Sector for Ease of Doing Business and Paperless Operations	Sh. Sanjay Bhatia, Retd. Chairman MbPT; Mr. Janardhan Rao, MD IPA; Mr. Sudhir Kanvinde, IPA; Mr. Rajeev Puri, IPA; Mr. Vivek Kele, TeamGlobal Logistics; Mr. Dhruv Kotak, Portall; Mr. Vidit Malhotra, Kale Logistics; Capt. Sandeep Mehta, Adani; Mr. Rizwan Soomar, DP World; Mr. Anil Devli, INSA; and other representatives from regulatory bodies such as Customs, FSSAI, etc.
TA 5: Make Maritime logistics highly cost competitive with end to end services	Sh. T.K. Ramachandran, Chairman, VoCPT; Sh. P Raveendran, Chairman ChPT; Sh. SK Mehta, Chairman DPT; Sh. Sunil Paliwal, Chairman, KPL; Sh. Bimal Kumar Jha, Dy. Chairman, VoCPT; Sh. Rinkesh Roy, Chairman, PPT; Mr. Julian Bevis, CSLA; Mr. Sunil Vaswani, CSLA; Capt. Deepak Tewari, CSLA; Capt. Vivek Singh, MD Shreyas Shipping; Sh. Anoop Kumar Agrawal, MD IPRCL; Sh. Pravir Prasad, Vice Chairman, IWAI; Dr. Abhijit Singh, IPA; Sh. Rajnish, JM Baxi; Mr. Mihir Das; Mr. Manish Joshi; Mr. Ishwar Achanta, NSB; and Mr. Tom Gole (Logistics Expert)

Thrust areas (TAs)	TA Members
TA 6: Make India the Cruise Development Hub of the World	Sh. Sanjay Bhatia, Retd. Chairman, MbPT; Sh. Ramesh Kumar, Chairman, MoPT; Dr. M Beena, Chairman, CoPT; Sh. V.R. Akkaraju, Chairman, NMPT; Member, Bureau of Immigration; Dr. Abhijit Singh, ED, IPA; Sh. Gyan Bhushan, Economic Advisor, MOT; Shri Pravir Pandey, Vice Chairman, IWAI; Mr. Venkatesan D, Regional Director, India Tourism; Mr. Jurgen Bailom, CEO, Jalesh Cruises; Capt. Nitin Dhond, MD, Angriya Cruises; Mrs. Nalini Gupta, MD, Costa Cruises; Mr. Sanjay Basu, Far Horizon Tours; Mr. Saurabh Gadkari, Jalesh Cruises; Mrs. Ratna Chaddha, Chairperson, INCLA; Mr. Subhash Goyal, Chairman, STIC Group; and Mr. Abhijeet Patil, Chairman, Raja Rani Travels
TA 7: Integration & enhancement of Indian maritime institutes of global standards	Sh. Amitabh Kumar, DG Shipping; Sh. Kumar Sanjay Bariar, Addl. DG Shipping; Sh. P Raveendran, Chairman, ChPT; Sh. Ashish Kumar Bose, Dy. Chairman, PPT; Sh. Umesh Wagh, Dy. Chairman, JNPT; Sh. Nandesh Shukla, Dy. Chairman, KPT; Dr. Abhijit Singh, ED, IPA; Dr. K Murali, NTCPWC; Dr. Kumaran Raju, NTCPWC; Dr. K.M. Sivakholundu, VC, IMU; Mr. Rizwan Soomar, DP World; Sh. Shrawan Rewari, ARI; Sh. Uday Purohit, IMEI; Dr. Sujata Naik Tolani, TMI; Smt. Malini Shankar, VC, IMU; Smt. H.K. Joshi, CMD, SCI; Capt. Vinod Naveen, IMU; Sh. Abdul G Serang, NUSI; Sh. Chirag Bahri, ISWAN; Sh. Sunil Kumar Panda, IMU; Capt. Saurabh Varshney, IMI; Smt. Sumiit Sharma, WISTA India; and Sh. G. Raghuram, IIMB
TA 8: Development of Indian ship building, repair recycling industry to world class level	Sh. Madhu Nair, CMD CSL; Sh. Pradeep Sudhakar, Chief surveyor DG shipping; Sh. Vijaykumar, President, SAI; Sh. P K Mishra, Head of operations, IRS; Shri Manoj, CS, Jt. GM L&T Shipyard; Sh. J.K. Nangia, Vice president, SAI; Sh. Anil Devli, CEO, INSA; Sh. Sivaram N, DGM, CSL; Sh. Debashish Mallick; Capt. Piyush Shah; Sh. Sreejith K.N., CGM, CSL; Sh. Yashodhan Wanage, Ex Dy. Chairman, MbPT; Sh. Kapil Kekre, Advisor INSA; Sh. Sahay Raj, Secretary, SAI; Sh. Devendran Jayaraj, AGM(SR), CSL; Sh. Haresh Parmar, Secretary, SAI; Sh. A K Mehera, Dy. Chairman, CoPT; Sh. K G Nath, Dy. Chairman, NMPT; Sh. P R Govil, Advisor, SAI; Sh. Nitin Kanakia; Sh. Athul Sharma, DGM (EMV), GMB; Mr. Kaori Uehigashi and Mr. Seungwook Oh (Ship Building experts)

Thrust areas (TAs)	TA Members
TA 9: Develop Water transport systems in Cities	Dr. Amita Prasad, Chairperson, IWAI; Sh. Pravir Pandey, Vice Chairman, IWAI; Sh. Amitabh Kumar, DG, Shipping; Sh. S Balaji Arunkumar, Dy. Chairman, KoPT; Sh. Sharad Sarangadharan, GMB; Sh. Ashish Kumar Bose, Dy. Chairman, PPT; Sh. Dilip Gupta, MD SDCL; Sh. Ramesh Kumar, Chairman, MoPT; Sh. Yashodhan Wanage, Dy. Chairman, MbPT; Mr. Abhijit Singh, ED IPA; and other 20+ stakeholders across terminal operators, vessel/barge operators, cruise operators, Port trusts, cargo owners and logistics service providers
TA 10: Reforms in all Maritime Acts / Laws / Regulations/Policy	Sh. Amitabh Kumar, DG Shipping; Mr. Rama Mohana Rao, Chairman VoCPT; Mr. T.K. Ramachandran, Chairman VPT; Dr. M Beena, Chairman CPT; Dr. M.K. Sharma, Advisor IPA; Mr. K.G. Nath, Dy. Chairman, NMPT; Mr. G.P. Rai, Dy. Chairman, MgPT; Mr. Bimal Kumar Jha, Dy. Chairman, VoCPT; Mr. GP Rai, Dy Chairman, MgPT; Mr. Madhu Nair, CMD CSL; Mrs. H.K. Joshi, CMD SCI; Capt. K.P. Jayakumar, NA to GOI; Dr. Abhijit Singh, IPA; Mr. A Balasubramaniam (Advocate & Port expert), Ms. S. Priya , Advocate; Mr. Raja Majumdar, Advocate; Ms. Sindhura Polepalli, Maritime Legal Consultant, DGS; Dr. P.K. Raut, DDG DGS GOI; Mr Suresh Kumar, DGS-GoI; Shri KS Bariar, Addl DG Shipping; Sh. Anil Devli, CEO INSA; and Sh. Debashish Mallick
TA 11: Become Global Maritime leader through active participation in global maritime activities	Sh. Sanjay Bhatia, Retd. Chairman, MbPT; Smt. H.K. Joshi, CMD SCI; Capt. Sandeep Mehta, President Adani Ports; Sh. Madhu Nair, CMD CSL; Sh. Jagmeet Makkar; Sh. Mihir Das; Dr. Jose Paul; Dr. Unnikrishnan Nair; Sh. K Ashok Vardhan Shetty; and Sh. Anil Devli, CEO INSA
TA 12: Make all Ports and other maritime bodies Health Safety Security and Environment (HSSE) compliant as per global benchmarks	Sh. SK Mehta, Chairman, DPT; Dr. Ms. M Beena, Chairman CoPT; Sh. Sunil Paliwal, Chairman, KPL.; Sh. Asish Kumar Bose, Dy. Chairman, PPT; Sh. Guruprasad Rai, Dy. Chairman, MoPT; Dr. R.D. Tripathi, Advisor, IPA; Sh. HN Ashwath, Development Advisor, Ports, MoPSW; Sh. A.Y. Sundkar, Director, National Safety Council; Mr. Ishwar Achanta, NSB; Mr. Rizwan Soomer, DP World; Ms. Penny Thetheus, Representative, DP World; Mr. Jibu Itty, Representative, DP World; Mr. Rajeev Tipnis, Director (Business Development), Oceanus Coastal Engineers LLP; Mr. Vivek Utpal, Energy Efficiency Services Limited; Mr. Peter Jameson (Global Expert on Greentech & GHG reduction in transportation); and Mr. Vishal Mehta (Expert on Energy & Environment)

Thrust areas (TAs)	TA Members
TA 13: Enhance India's stature in global shipping and share in seafarer	Sh. Amitabh Kumar, DG Shipping; Sh. Kumar Sanjay Bariar, Addl. DG Shipping; Sh. Sanjay Bhatia, Retd. Chairman, MbPT; Smt. H.K. Joshi, CMD SCI; Sh. Madhu Nair, CMD CSL; Sh. P Raveendran, Chairman, ChPT; Sh. Ashish Kumar Bose, Dy. Chairman, PPT; Sh. Umesh Wagh, Dy. Chairman, JNPT; Sh. Nandesh Shukla, Dy. Chairman, KPT; Dr. Abhijit Singh, ED, IPA; Dr. K Murali, NTCPWC; Dr. Kumaran Raju, NTCPWC; Dr. K.M. Sivakholundu, VC, IMU; Sh. Jagmeet Makkar; Sh. Mihir Das; Dr. Jose Paul; Dr. Unnikrishnan Nair; Sh. K Ashok Vardhan Shetty; Sh. Anil Devli, CEO INSA; Capt. Sandeep Mehta, President Adani Ports; Mr. Rizwan Soomar, DP World; Sh. Shrawan Rewari, ARI; Sh. Uday Purohit, IMEI; Dr. Sujata Naik Tolani, TMI; Smt. Malini Shankar, VC, IMU; Smt. H.K. Joshi, CMD, SCI; Capt. Vinod Naveen, IMU; Sh. Abdul G Serang, NUSI; Sh. Chirag Bahri, ISWAN; Sh. Sunil Kumar Panda, IMU; Capt. Saurabh Varshney, IMI; Smt. Sumiit Sharma, WISTA India; and Sh. G. Raghuram, IIMB
TA 14: Promotion of Inland Waterways Transport	Dr. Amita Prasad, Chairperson, IWAI; Sh. Pravir Pandey, Vice Chairman, IWAI; Sh. Amitabh Kumar, DG, Shipping; Sh. S Balaji Arunkumar, Dy. Chairman, KoPT; Sh. Sharad Sarangadharan, GMB; Sh. Ashish Kumar Bose, Dy. Chairman, PPT; Sh. Dilip Gupta, MD SDCL; Sh. Ramesh Kumar, Chairman, MoPT; Sh. Yashodhan Wanage, Dy. Chairman, MbPT; Mr. Abhijit Singh, ED IPA; and other 20+ stakeholders across terminal operators, vessel/barge operators, cruise operators, Port trusts, cargo owners and logistics service providers



APPENDIX 2

Initiatives summary and roadmap

Chapter 1 Initiative summary (1/4)

Key activities		Target
1.1	**Drive capacity expansion across major ports in phases basis traffic growth forecasts –**	
	Phase – I	
	• Extension of ICTT terminal with ~4.5 MTPA container capacity at Cochin port	2022
	• Extension of BMCT container terminal with ~30 MTPA capacity on DBFOT basis at JNPT port	
	• Modification of Iron ore terminal to ~12 MTPA coal terminal (SIOTL) at Kamarajar port	
	• ~18 MTPA coal handling capacity addition through CB-3 & berths at Kamarajar port	
	• ~11 MTPA coal handling capacity addition through Multi-cargo and Bulk terminal at Kamarajar port	
	• Rejuvenation of KPD berths for ~5.5 MTPA container capacity at Kolkata Dock Complex	
	• Setup floating cranes, RMQCs, etc. for ~8.5 MTPA container capacity addition at Kolkata DC	
	• Mechanization of Berth No. 3 (~3.5 MTPA bulk capacity) on DFBOT basis at Haldia Dock	
	• Berth mechanization (EQ-1, EQ-2, EQ-3, CQ-1, & CQ-2) for ~23 MTPA coal capacity at Paradip	
	• New ~10 MTPA bulk berth development for coal imports at Paradip port	
	• Conversion of Berth 9 to handle container traffic (12 MTPA capacity) at V.O.Chidambaranar port	
	• Mechanization of Berth 3 & 4 for ~16 MTPA container capacity at V.O.Chidambaranar port	
	Phase - II	2023
	• Pipeline rationalization for 4 Oil jetties for ~16 MTPA capacity addition at Deendayal port	
	• Construction of 6 Oil jetties at Deendayal dock, 1 SBM at Vadinar, and 2 product jetties at Vadinar for ~44 MTPA POL and liquids capacity at Deendayal port	
	• 4 MTPA Fifth Oil berth addition at Mumbai port	
	• Setup of Floating Storage Regasification Unit for 5 MTPA capacity expansion at Mumbai port	
	• Re-development of 1 Iron Ore & 3 barge berths to handle general cargo (14 MTPA) at Mormugao port	
	• Setting up ~2 MTPA coastal cargo berth at Mormugao port	
	• Extension of container terminal with ~9.5 MTPA capacity on DBFOT basis at Vishakapatnam port	
	Phase - III	2025
	• New ~31 MTPA Container terminal (in phases) at Kamarajar port	
	• ~3 MTPA IOCL captive jetty at Kamarajar port	
	• Addition of ~3 MTPA Marine Liquid Terminal on PPP basis at Kamarajar port	
	• Additional ~5 MTPA LNG Terminal in Kukrahati at Kolkata port	
	• Setup of liquid cargo jetties for ~4.5 MTPA capacity at Kolkata port	
	• 2 MTPA Chemicals capacity expansion in Pir Pau at Mumbai port	
	• Mechanization of Berth No. 14 for ~6 MTPA container capacity addition at NMPT	
	• Construction of new berth No. 17 for ~7 MTPA POL capacity addition at NMPT	
	• New ~10 MTPA iron ore berth development at Paradip port	
	• Development of ~0.6 MTPA LPG terminal at Paradip port	
	• Deepening & Optimization of Inner Harbour facilities for ~25 MTPA cargo capacity at Paradip port	
	• Development of Mahanadi Riverine Port (Phase-I) for ~21 MTPA capacity at Paradip port	
	• Development of additional ~5.3 MTPA oil handling facility at Vishakapatnam port	
	• NCB III berth mechanization for ~9 MTPA bulk capacity under PPP mode at V.O.Chidambaranar port	

Chapter 1 Initiative summary (2/4)

Key activities		Target
1.2	**Develop Vadhavan-JNPT cluster (in phases) on West Coast with 20m deep draft and ~10,000 hectares of land to drive industrialization**	
	Vadhavan Port	
1.2.1	Vadhavan - EC and CRZ clearance finalization	Q2, 2021
1.2.2	Submission and clearance of PIB/PPPAC PROPOSAL	Q1, 2022
1.2.3	Award and commencement of EPC and PPP bids	Q3, 2022
1.2.4	EPC works completion (breakwater, road connectivity, power, etc.)	Q2, 2024
1.2.5	10,000 hectares of land mass acquisition and approval for SEZ status	Q2, 2024
1.2.6	PPP commissioning and container terminals 1 to 4 operationalization	Q2, 2024
1.2.7	Complete Phase-I (LNG berths, Ro-Ro, etc.) operationalization	Q4, 2024
1.2.8	Phase-II capacity operationalization	Q4, 2030
	JNPT Port	
1.2.9	Capacity augmentation projects:	
	• Construction of Coastal Berth	Q3, 2022
	• Development of Container Terminal by BMCT(Phase-II)	Q4, 2022
	• Additional Liquid Cargo Terminal - Phase 1	Q2, 2023
1.2.10	Hinterland connectivity projects:	
	• 6 to 8 laning of NH-4B- SH-54 and Amra Marg	Q2, 2021
	• Expressway from Dighi Industrial Cluster -Pune to JNPT	Q3, 2022
	• Expressway from Sanathnagar industrial cluster - Hyderabad to JNPT	Q2, 2023
	• 3rd line rail connectivity from Jasai to JNPT	Q1, 2024
	• Development of DFC compliant rail yard at JNPT	Q4, 2024
1.3	**Develop Paradip as World-class Dry bulk port on East Coast**	
1.3.1	Capacity augmentation projects:	
	• Mechanization of EQ-1,2 & 3 (3 Berths) for handling export Coal Cargo (Till date: 715 Cr; 2021: 720 Cr)	Q3, 2021
	• LPG Terminal at South Oil Jetty (Till date: 350 Cr; 2021: 340 Cr)	Q4, 2021
	• Development of New Coal Berth for handling Import Coal Cargo (Till date: 460 Cr; 2021: 195 Cr)	Q4, 2021
	• Mechanization of SQB Berth	Q3, 2023
	• Optimization of Inner Harbour facilities – (Till 2024: 630 Cr; 2025-2027: 2370 Cr) (CCEA Note underway)	Q1, 2027
	• Mechanization of CQ-1 & 2 (2 Berths)	Q4, 2027
	• Mahanadi Riverine Port (Phase-I)	Q4, 2027
1.3.2	Hinterland connectivity projects:	
	• Rail - Haridaspur-Paradip New line, MGR BOT line and EQ Rail Infrastructure (Till date: 3040 Cr; 2021: 160 Cr)	Q4, 2021
	• Road - Concrete road building, uniflow and 2nd exit establishment (Till 2022: 90 Cr; 2023: 60 Cr)	Q4, 2023
1.3.3	MMLP setup: Rail facilities & warehousing (Till date: 130 Cr; Till 2024: 2270 Cr)	Q1, 2024
	MMLP setup: 100% port land industrialization (2025-2027: 4000 Cr)	Q4, 2027
1.4	**Develop Deendayal – Tuna Tekra (in phases) on West Coast with 19m deep-draft**	
1.4.1	Techno-economic feasibility study to expand Tuna Tekra terminal	Q2 2021
1.4.2	Capacity addition projects:	
	• Pipeline rationalization of Oil jetty 1 to 4 (Till 2022: 40 Cr; 2023-2024: 130 Cr)	Q4, 2024
	• Conversion of general cargo berth to mechanized fertilizer handling facility (Till 2022: 60 Cr; 2023-2024: 240 Cr)	Q4, 2024
	• Oil jetty cum bunkering complex	Q4, 2024

Chapter 1 Initiative summary (3/4)

	Key activities	Target
	• Container terminal at Tuna Tekra (Till 2024: 3000 Cr; 2025: 2200 Cr)	Q4, 2025
	• Mechanized Bulk terminal at Tuna Tekra(Till 2024: 1000 Cr; 2025: 1000 Cr)	Q4, 2025
	• Construction of Oil Jetties - 7,8,9,10 and 11 (Till 2022: 100 Cr; 2023-2024: 350 Cr; 2025: 300 Cr)	Q4, 2025
	• 1 SBM and 2 product jetties at Vadinar (Till 2024: 330 Cr; 2025: 118 Cr)	Q4, 2025
1.5	**Evaluate and develop Kamarajar (in phases) on East Coast**	
1.5.1	Capacity addition projects:	
1.5.2	• Modification of Iron ore to coal terminal (SIOTL)	Q4, 2021
1.5.3	• Container Terminal (Phase-1, Stage-II)	Q4, 2021
1.5.4	• Coal Berths -3 & 4 (TNEB)	Q4, 2022
1.5.5	• General Cargo berth 2	Q1, 2024
1.5.6	• IOCL Captive Oil Jetty	Q4, 2024
1.6	**Develop a Transshipment Hub in Southern India**	
1.6.1	**Vizhinjam Port**	
1.6.1.1	Support from Central Govt. to facilitate EoDB and infra development	Q4, 2021
1.6.2	**Kanyakumari region**	
1.6.2.1	Re-evaluate business feasibility as per TS study post traffic commencement at Vizhinjam	Q2, 2024
1.6.2.2	Conduct tender process and develop TS hub in Kanyakumari region on PPP basis	Q4, 2028
1.6.2.3	Collaborate or partner with 1-2 anchor liners for success of transshipment hub	Q4, 2028
1.6.3	**Campbell Bay – Development of TS hub on PPP basis**	**Q4,2025**
1.6.4	**Enhance Transshipment volumes at Cochin Port**	**Q4,2022**
1.7	**Landlord model acceleration for Major Ports**	
Phase 1: Landlord model adoption for 38 identified berths across major ports		
1.7.1	DPT	
	• Berth 13, 14, 15, 16,	Q4, 2025
1.7.2	JNPT: Covered in 1.1.2.1	
1.7.3	MoPT	
	• Conversion of berth 9 and 3 barge berths	Q4, 2024
	• Berths 10 & 11	Q4, 2024
1.7.4	NMPT	
	• Berth 14	Q4, 2021
	• Berths 9, 10, & 11	Q4, 2025
1.7.5	VoCPT	
	• Berths 9 and NCB III	Q4, 2022
	• Conversion of 1, 2, 3, & 4 berths	Q4, 2024
	• Conversion of 5 & 6 bulk berths	Q4, 2028
1.7.6	VPT	
	• Berth EQ7	Q4, 2024
	• Berths WQ7 & WQ8	Q4, 2024
1.7.7	PPT: Covered in 1.1.3.1	
1.7.8	CoPT: NCB berth	Q4, 2025

Chapter 1 Initiative summary (4/4)

Key activities		Target
1.7.11	SMP Kolkata	
	• Berth 2	Q4, 2022
	• Berth 5 & 10	Q4, 2023
	• Berth 11 & 12	Q4, 2025
	• Berth 1, 9 & 14	Q4, 2026
1.7.12	Phase 2: Re-evaluation of remaining berths potential for landlord model	Q4, 2025
1.8	**Maximizing mechanized bulk berth operations across major ports: 21 high potential identified berths in Phase-I, 87 berths in Phase-II (basis re-evaluation in 2-3 years)**	**Ph-1: Q4, 2024 Ph-II: Q4, 2027**
1.9	**Draft enhancement for Major Ports**	
1.9.1	All Major Ports to conduct technical assessment to identify potential berths for draft enhancement	Q2, 2022
1.9.2	Dredging for Container terminals at Major Ports –	
	• Phase-1: Min. 1 berth with 16-16.2m draft availability	Q2, 2024
	• Phase-2: Min. 1 berth with 18m+ draft at Mega Container Ports	Q4, 2024
1.9.3	Dredging for Bulk terminals at Major Ports –	
	• Phase-1: Max. berths as Panamax compliant (14m+ draft)	Q2, 2024
	• Phase-2: Min. 1 berth as Capesize compliant for terminals with >1 Capesize ship call per week	Q4, 2024

Chapter 2 Initiative summary (1/3)

Key activities		Target
2.1	**Food grain: Establish food grain depots near 6 ports (Chennai, NMPT, Cochin, Tuticorin, Karaikal, Mormugao) in coordination with FCI**	
2.1.1	Conduct joint discussions with ports & FCI to define strategy	Q2, 2021
2.1.2	Allotment of land, order design and tendering for construction	Q4, 2021
2.1.3	Completion of construction works	Q2, 2022
2.2	**Coal: Push for implementation of port connectivity projects (e.g. mine to port via rail) and drive coastal coal adoption at western ports**	
2.2.1	Conduct joint discussions with MoR to expedite development of the rail connectivity projects on Talcher to Paradip route	Q1, 2022
2.2.2	Build coal handling and storage requirements at major & minor western ports handling coastal coal	
	• Feasibility study, TEFR and EOI to setup storage locations	Q2, 2021
	• RFQ, RFP and LoI facilitation for project tendering	Q3, 2021
	• Completion of construction works	Q1, 2024
2.3	**Cement: Build silo infrastructure to improve coastal vessel turnaround time at targeted ports and drive additional cement coastal demand**	
2.3.1	Conduct joint discussions with ports & shipping operators to move clinker (and steel) along two-way coastal circuits (such as TN-WB, OD-TN)	Q1, 2021
2.3.2	Develop silo cement storage infrastructure at targeted major and minor ports for coastal shipping (such as Paradip/Dhamra/Gopalpur, Haldia, JNPT, New Mangalore) via PPP route	
	• Feasibility study, TEFR and EOI to identify potential customers	Q4, 2021
	• RFQ, RFP finalization for project tendering	Q2, 2022
	• Completion of construction works	Q2, 2023
2.4	**POL: Ensure infrastructure readiness to support POL coastal cargo increase projected by 2030**	
2.4.1	Additional Liquid Cargo Handling Jetty with storage tank at SMP Kolkata	Q2, 2023
2.4.2	New berth construction at Kamarajar	Q2, 2024
2.5	**Steel: Develop coastal circuits for steel and agglomeration centers to drive growth of steel coastal cargo**	
2.5.1	Conduct joint discussions with ports & shipping operators to move steel (& clinker) along two-way coastal circuits & push use of EXIM vessels	Q1, 2021
2.5.2	Develop steel agglomeration centers via PPP route at select load ports (Paradip, Haldia) to enable aggregation of cargo at ports	Q1, 2023
2.6	**Drive coastal cargo adoption of other commodities (e.g. container cargo) across major and minor ports**	
2.6.1	Push for use of EXIM containers for domestic cargo for carrying container commodities to help reduce container repositioning costs	Q4, 2021
2.6.2	Evaluate storage and handling infra requirements at major and minor ports for other commodities basis current cargo profile and future projections	Q4, 2025
2.7	**Establish a Coastal and Inland Cargo Facilitation Center (CCFC) under MoPSW to drive demand for coast cargo through outreach and collaborative planning with select PSUs, trade associations, private players and Rail/ road ministries**	
2.7.1	Set-up a dedicated center with to drive coastal demand	Q2, 2021
2.7.2	Drive coastal adoption of priority commodities by creating plan of actions (routes, target players & associated ports) and initial discussions with select PSUs and private shippers	Q3, 2021
2.7.3	Implement identified action plans through detailed discussions with associated stakeholders (PSUs, private players, logistics service providers, rail & road ministries)	Q3, 2022
2.8	**Improve terminal performance for all container terminals with low QC productivity (less than 30 moves/hour) with measures such as -**	
2.8.1	Deployment of pre berthing optimization software and process systems	Q3, 2021

Chapter 2 Initiative summary (2/3)

Key activities		Target
2.8.2	Shift change time optimization to less than 10 minutes per instance	Q3, 2021
2.8.3	QC operator skill improvement through training and incentivization	Q2, 2022
2.8.4	Implement measures - dual cycling of QC and twin lift enablement	Q4, 2022
2.8.5	Upgrade or automate multiple degrees of freedom in crane operations	Q4, 2024
2.8.6	Improving yard and evacuation performance for container terminals	Q4, 2024
2.9	**Improve berth productivity for dry bulk terminals through -**	
2.9.1	Institutionalizing berth operating norms for each port basis best in class practices and on-ground factors in alignment with all maritime stakeholders	Q2, 2022
2.9.2	Implementing measures to reduce Non-working time at berth -	
	• Haul-in-haul out optimization for vessels	Q3, 2021
	• Institutionalizing hot seat changes for crane operators	Q2, 2022
	• Preventive/Predictive maintenance of stackers, conveyors, Wagon tipplers, etc.	Q2, 2023
2.10	**Accelerate implementation of prioritized multi-modal connectivity projects (rail, road, coastal and inland waterways) to ports**	
2.10.1	Phase 1 - Drive accelerated execution of prioritized 25 port connectivity project as well as 3 additional identified projects (10 road, 13 rail, 1 pipeline, 1 MMLP, 1 mega 4-lane coastal road, 2 coastal and inland waterways connectivity)	Q4, 2025
2.10.2	Phase 2 & 3 - Drive execution of 65 medium and 120 low priority port connectivity projects, 10 multi-modal routes in a phase-wise manner	Q4, 2030
2.11	**Deploy commodity-specific ancillary services & facilities (such as faster food testing by FSSAI) at ports**	**Q4, 2022**
2.11.1	Each port to allocate space within port premises to relevant PGAs basis Cargo profile to reduce PGA clearance/approval time	Q2, 2021
2.11.2	Drive targeted cold storage and agri infrastructure strengthening basis evaluation of cargo profile, current gaps, land availability, & logistics impact	Q4, 2022
2.12	**Reduce Vessel Related Charges (VRCs) in line with market trends and capital requirements**	
2.12.1	Each port to conduct study on potential ways to reduce VRCs (both revenue and cost measures)	Q4, 2021
2.12.2	Discussions and finalization with MoPSW on initiatives to reduce VRC	Q1, 2022
2.12.3	Implementation of finalized revenue measures (e.g. non-core asset monetization, port led industrialization, etc.)	Q2, 2023
2.12.4	Implementation of finalized cost measures (e.g. berth mechanization, manpower redistribution, etc.)	Q2, 2023
2.13	**Pilot and develop prioritized non-conventional sources of revenue for ports**	**Q4, 2023**
2.14	**Increase use of Direct Port Delivery and Direct Port Entry at Indian ports to reduce the transit time and overall costs**	
2.14.1	Assess the current readiness of the port for a roll-out of DPD and DPE (storage area, number of trailers, RFID tags, etc.) and strengthen requisite infrastructure	Q3, 2021
2.14.2	Roll out DPD and DPE in a phase-wise manner across major ports with defined adoption targets (e.g. 20% traffic in year 1)	Q2, 2024
2.15	**Reduce other logistics costs (eg. container related costs)**	
2.15.1	Conduct comprehensive study to identify issues related to container availability and returns	Q2 2021
2.15.2	Assist in drafting a policy to promote container manufacturing in India	Q2 2021
2.16	**Ports to explore co-development models to drive port led industrialization through collaboration with various partners (e.g. partnership with state governments, central bodies – NICDC, etc.)[1]**	
2.16.1	Conduct joint discussions with partners (e.g. state governments, state industrial bodies, central bodies – NICDC, private developers) for collaboration for industrialization	Q2, 2021
2.16.2	Onboard co-developers/partners for developing part land or initiate self-development (basis ports' strategy)	Q1, 2022

Chapter 2 Initiative summary (3/3)

Key activities		Target
2.17	**Drive commodity-specific industrialization efforts by identifying targeted industries relevant to port location**	
2.17.1	Evaluate and identify specific commodities/industries to target basis port's location, cargo profile and growth expectations of various industries	Q4, 2021
2.17.2	Drive discussions with state and central government to obtain sector-specific incentives (e.g. allot port land for a sector-specific parks)	Q2, 2022
2.18	**Develop plug and play infrastructure/value added services (using Maritime Development fund, cash reserves or with co-developer) and commercial flexible terms for attracting industries to port land**	
2.18.1	Each port to conduct an assessment and finalize type of plug & play infrastructure to be provided for attracting target industries	Q4, 2021
2.18.2	Deploy upfront capital required for infrastructure development (use port's reserve, avail MDF, and/or partner with co-developer)	Q2, 2022
2.18.3	Develop plug and play infrastructure (e.g., road connectivity, power-sewage-water connectivity) and value-added services at port land	Q2, 2023
2.19	**Establish centralized investor outreach and marketing cell under IPA/MoPSW to attract investment in port land**	
2.19.1	Establish a specialized investor outreach and marketing cell by building Business Development & commercialization capabilities	Q1, 2021
2.19.2	Define key objectives, functions (e.g. promote FDI investment for ports with progress monitoring mechanism, ensure handholding of investors till implementation) and targets for the cell (e.g. annual FDI increase targets)	Q1, 2021
2.19.3	Drive consultations with the ports to finalize the operating model and engagement mechanism	Q2, 2021
2.19.4	Set up a one stop shop digital land portal to provide real-time information of land at ports to investors	Q1, 2022

Chapter 3 Initiative summary

Key activities		Target
3.1	**National Logistics Portal (NLP) Marine to enable single integrated platform for EXIM activities across stakeholders**	
3.1.1	Selection of Bidder and Tender allocation	Dec, 2020
3.1.2	Submission and Acceptance of detailed Software Requirement Specification (SRS)	Jan, 2021
3.1.3	Development and Deployment of Platforms (Cargo, Carrier etc.)	May,2021
3.1.4	Integration with external applications (ICEGATE, Certification Systems) and Relevant PGA/EPC as per SRS	
	• Integration with ICEGATE	Jun, 2021
	• Integration with PGA's and EPC's	Aug, 2021
	• Integration with Certification systems (e.g. Cerf. Of Origin)	Sep, 2021
3.1.5	UAT, Training & Pilot implementation	Nov, 2021
3.1.6	Go-live and stabilization	Dec, 2021
3.2	**Establish a Digital Center of Excellence (DCoE) under IPA to develop standardized architecture across ports and drive transition of Indian ports to "Smart ports"**	
3.2.1	Basis detailed technical study, map out digital infrastructure requirements for a pilot port (data centers, IT infrastructure, etc.)	Q2, 2021
3.2.2	On-board a Multi-System Integrator (service provider) for 20 "Must-have" technology solutions pilot (e.g. Next-gen VTMS, asset health monitoring, etc.)	Q2, 2021
3.2.3	Roll-out "Must-have" technology solutions across major ports to enable digital transformation of ports	Q4, 2022
3.2.4	Pilot 24 "Driving logistics efficiency" technology solutions across ports basis actual traffic volume and cargo profile to drive scalability and cost effectiveness	Q2, 2024
3.2.5	Enable 13 "World class ports" technology solutions across ports to drive transition of Indian ports to Smart Ports of the future	Q4, 2025
3.3	**Standardize internal processes and deploy Enterprise Business System (EBS) across 5 Major Ports**	
3.3.1	Phase 1: Primary solution development	Q1, 2021
	• Development of primary modules such as port operations, finance, vendor self-service, etc.	
	• Integration with PCS and allied systems	
	• Setup of call center, IT helpdesk, & Port service center	
3.3.2	Phase 2: Backend systems integration	
	• Development of secondary modules such as administration, engineering, maintenance, etc.	
	• Integration with GIS and internal port systems	
	• Online electronic office with immediate workflow	
	• Enabling disaster recovery site & Port Command center	
3.3.3	Phase 3: Full-scale operationalization	
	• Integration and operationalization of all modules	
	• Integration with partner and customer systems	
	• User Acceptance Testing	
3.4	**Develop digital registration and certification portal for Indian flagged ships and drive acceptance of e-documents across ports**	
3.4.1	Onboard IT partner to digitalize ship registration process to submit e-forms & get access to e-certificates	Q1, 2021
3.4.2	Digitize module on 'Registration of Mortgage'	Q1, 2021
3.4.3	Onboard IT partner to augment ship registration website	Q1, 2021
3.4.4	Engage with Indian Ocean MoU for transitioning and acceptance of digital certificates for foreign vessels across all ports	Q1, 2022
3.5	**Promote digitization of IWAI operations to increase efficiency**	
3.5.1	Digital portal providing key systematic river and navigational information	Q2, 2021
3.5.2	Develop an aggregator model to provide E2E solution to cargo owners	Q4,2023
3.5.3	Evaluate use of Block-chain technology for secured data exchange among all stakeholders	Q4,2025

Chapter 4 Initiative summary (1/2)

Key activities		Target
4.1	**Implement action items under Major Port Authorities Act 2021 to enhance governance of Major Ports**	**Q2 2021**
4.2	**Transform 'Indian Ports Association' to nationally coordinate efforts across Major Ports**	**Q3, 2021**
4.2.1	Detailed study to re-define responsibilities and organization structure for IPA	Q2 2021
4.2.2	Establish team with requisite capabilities, publish agenda & drive execution	Q3 2021
4.2.3	Drive nationally coordinated efforts along following key areas: • Planning & technical advisory • Projects and business development • Implementation & centers of excellence • Large procurement, HR & training for leadership	Q1 2022
4.3	**Implement action items (e.g. setting up a regulatory body, national port planning, etc.) under Indian Ports bill 2020 to enhance governance of Indian ports**	**Q2 2021**
4.4	**Design & institutionalize Indian Maritime Centre for India:**	**Q4, 2021**
4.4.1	Integrate maritime ecosystem	Q1, 2022
4.4.2	Improve participation at Global forum like IMO	Q4, 2021
4.5	**Revise existing Model Concession Agreement to improve contracting process & attract private investment (e.g. condition precedents, dispute resolution, min. performance standards, etc.)**	
4.5.1	Constitute a committee to study required revisions in existing MCA models	Q1 2021
4.5.2	Committee to recommend final revisions/additional provisions in MCA	Q1, 2021
4.5.3	Conduct joint discussions with all stakeholders and refine identified changes	Q2, 2021
4.5.4	Draft a Cabinet note for identified revisions in existing MCA	Q2, 2021
4.5.5	Facilitate inter-ministry consultations and incorporate feedback accordingly	Q2, 2021
4.5.6	Final note to Cabinet for approval	Q3, 2021
4.6	**Promoting captive jetties**	
4.6.1	Promote captive jetty in India by addressing key current issues	Q4, 2021
4.6.2	Implement specific changes in policy for captive jetty across following key areas: • Capacity addition • Cargo change and utilization improvement • Additional land allotment • Bidding eligibility	Q4, 2021
4.7	**Draft new Model Concession Agreements (OMT and O&M models) to promote PPP in 3-5 years depending on the current labor situation, cargo profile and market condition**	
4.7.1	Appoint a Consultant for drafting new PPP models	Q2, 2021
4.7.2	Prepare first draft of new MCA models	Q4, 2021
4.7.3	Review and finalize draft MCA models with approvals from MoPSW	Q1, 2022
4.7.4	Circulate MCA for cross ministerial consultation	Q2, 2022
4.8	**Ensure adequate provisions in the Land Use Policy to support various collaboration models (central/state govt. , industrial bodies, etc.)**	
4.8.1	Ensure provisions added are in line with Central Govt. initiatives e.g. National Investment and Manufacturing Zones (NIMZ) Policy	Q3, 2021
4.8.2	Collaborate with central bodies and state governments for development of port land and extend benefits (industrial park benefits, tax benefits, etc.)	Q4, 2022

Chapter 4 Initiative summary (2/2)

Key activities		Target
4.9	**Implement specific changes in key legislation to address issues in the sector– Merchant Shipping Bill**	
4.9.1	Draft Merchant Shipping Bill incorporating key reform areas such as Vessel registration and regulation, Seafarer welfare and training, Abandonment and emergency fund, Fishing vessels, and International conventions & obligations	Q2, 2021
4.9.2	Public comments, cabinet approval & introduction in parliament	Q3, 2021
4.10	**Implement specific changes in key legislation to address issues in the sector - Light House and Light ships Act**	
4.10.1	Formulate revisions in Light House and Lightship Act along following areas: • Regulation and monitoring of DGLL's obligations/ functions under IMO • Standardization of light dues calculation methodology • Also undertake initiative for rationalization of charges and ensuring all feed related to vessel information to flow into LRIT	Q1, 2022
4.11	**Set-up Maritime Development Fund (MDF) for low-cost, long-term financing support to maritime sector stakeholders**	**Q2, 2021**
4.12	**Promote tonnage under Indian flag (AtmaNirbhar Bharat) by 2022**	**Q4, 2022**
4.12.1	Revise RoFR Guidelines and online system	Q4, 2020
4.12.2	Subsidy support for Indian Flag with MoF consent	Q2, 2021
4.13	**Formulate incentives for promoting coastal shipping in India**	
4.13.1	Deferred taxation for investment in coastal shipping (through accelerated depreciation mechanism)	Q4, 2021
4.13.2	Priority berthing - conduct a detailed study on opportunity cost wrt. EXIM cargo vs. delay for coastal vessel	Q4, 2021
4.14	**Work with MoF for developing dedicated policy and capacity in select commercial banks like SBI and EXIM bank for lending in shipping sector**	**Q4, 2021**
4.15	**Work with Ministry of Finance to extend concessional income tax rates for promotion of ship leasing activities**	**Q4, 2021**
4.16	**Collaborate with Ministry of Finance to grant Infrastructure Status to Shipping Industry to enhance availability of low-cost long term funds availability**	**Q4, 2021**

Chapter 5 Initiative summary (1/2)

Key activities		Target
5.1	**Channelize domestic demand for Indian Shipbuilding by leveraging PPP (Aatmanirbhar Bharat)**	
5.1.1	Short term: Tugs & port crafts	
	• Define rules/SOPs for indigenizing Tugs & port craft construction	Q4, 2020
	• Freeze India specific requirements	Q4, 2020
	• Finalize & publish standard designs for Tugs	Q2, 2021
	• Implement long term charter agreement (7 yrs+) for major ports	Q2, 2021
5.1.2	Short term: Small & medium dredgers	
	• Define rules/SOPs for indigenizing dredger construction	Q1, 2021
	• Freeze India specific dredger design requirements	Q3, 2021
	• Implement long term charter agreement for ports & IWAI	Q3, 2021
5.1.3	Short term: Offshore, Research & SSLNG vessels	
	• Define rules/SOPs for indigenizing offshore/research vessel construction	Q3, 2021
	• Identify & publish India specific requirements that are to be pursued under Atmanirbhar	Q4, 2021
	• Implement long term charter agreement (7 yrs+) for Govt bodies & PSUs	Q1, 2022
5.1.4	Publish staggered customs duty for used Foreign vessel import	
	• Non-cargo vessels (Tugs & small dredgers)	Q1, 2022
	• Cargo vessels (small coastal and inland)	Q1, 2022
5.2	**Develop common platform for ancillaries to showcase the products available for Indian shipbuilding**	**Q4, 2020**
5.3	**Create common database of standard-vessel basic designs with pre-approval from IRS available to all shipyards to drive standardization, improve design process and leverage cost economies**	**Q1 2023**
5.4	**Develop strong marine design ecosystem by identifying design clusters and incentivizing for 'Design in India'**	**Q1 2023**
5.4.1	IRS to shortlist a design software	Q1, 2021
5.4.2	Secure adequate licenses for overall Indian ecosystem	Q1, 2021
5.4.3	Establish process to lease the design software for the specified project duration to Indian shipyards and design firms (Principle–no profit, no loss)	Q2, 2021
5.5	**Channelize domestic demand for Indian Ship repair by leveraging PPP (Aatmanirbhar Bharat)**	
5.5.1	Short term:	
	• Issue compliance guidelines to operationalize Aatmanirbhar Bharat	Q4, 2020
	• Extension of prevailing RoFR upto 2030	Q1, 2021
5.5.2	Mid term:	
	• Extend Aatmanirbhar provisions to all vessels availing cargo ROFR through PSUs and Government entities	Q4, 2022
	• Extend Aatmanirbhar provisions to all vessels with long term time charters (7+ Yrs) from PSUs and Government entities	Q4, 2022
	• Revise GST for Ship Repair to 5% for India flag vessels and nil for foreign flags	Q2, 2022
	• Rationalize all input and direct input service GST to 5%	Q2, 2022
5.6	**Enhance ship repair capability in India**	
5.6.1	Develop two ship repair clusters (one each on the East & West coast) with focus on ancillary industry development	Q4, 2022
5.6.2	Specify revisions in FTWZ act for Depots/Warehouses for Ship Repair	Q1, 2022
5.6.3	Deploy 2 used floating drydocks through PSU shipyards	Q4, 2022
5.7	**Develop Centers of Excellence (CoE) for Ship repair in India**	**Q4 2022**

Chapter 5 Initiative summary (2/2)

Key activities		Target
5.8	**Modification of BIS regulations (IS 1786:2008) governing TMT bar production to allow usage of ship scrap basis material composition and strength/ quality in place of existing requirement of metallurgical history**	**Q1 2021**
5.9	**Enhance Ship recycling infrastructure through redevelopment of Alang plots and establishment of additional recycling cluster on East Coast**	
5.9.1	Development of Ship recycling park at Alang	Q1, 2022
5.9.2	Development and establishment of ISO 17025 testing lab at Alang	Q4 2021
5.9.3	Ensure adoption of a zero-residue model at all ship recycling plots	Q4, 2024
5.9.4	Development of a ship recycling cluster on east coast	Q4, 2025
5.10	**Setup ship recycling facilitation centre to promote ship recycling activities and enhance marketability of ship by-products through trade fairs at ship breaking yards involving stakeholders across shipowners to downstream industries**	
5.10.1	Establish Ship recycling facilitation centre	Q1, 2021
5.10.2	Conduct first 2-day fair with both Indian and International stakeholders at Alang	Q1, 2021
5.10.3	Establish mechanism to host bi-annual fairs for trade promotions	Q4, 2021

Chapter 6 Initiative summary (1/2)

Key activities		Target
6.1	**Operationalize 23 waterways by 2030 through infrastructure enhancement (10 out of 16 functional and 7 new waterways), fairway development, navigational aids and RIS provisioning**	
6.1.1	National Waterway 1 –	
	• Construction & operationalization of Haldia multi-modal terminal	Q1, 2021
	• Signing of Concessionaire agreement of Haldia & Varanasi MMT	Q1, 2021
	• Development of navigation lock at Farakka along NW 1	Q2, 2021
	• Completion of Dredging Farakka – Kahalgaon section (Mar-22)	Q1, 2022
	• Navigational Aids deployment & RIS stations operationalization	Q2, 2022
	• Concessionaire agreement for Sahibganj MMT and Gaighat Terminal	Q3, 2022
	• Completion of Dredging Sultanganj – Mahendrapur section (Mar-23)	Q1, 2023
	• Completion of Dredging Mahendrapur – Barh section (Mar-23)	Q1, 2023
	• Development of an integrated vessel repair and maintenance complex near Sahibganj multi modal terminal	Q4, 2023
	• 3 intermodal cargo terminals to enhance connectivity and reduce cost of cargo – Kalughat, Tribeni, Ghazipur	Q4, 2023
	• Completion of Freight Village at Varanasi and ICLP at Sahibganj	Q4, 2024
6.1.2	National Waterway 2 and 16 –	
	• Award of work for construction of Jogighopha terminal	Q1, 2021
	• PPAC approval of Pandu Ship repair facility	Q1, 2021
	• Award of work for construction of Jogighopha terminal	Q1, 2021
	• Award of work for Pandu ship repair facility	Q2, 2021
	• Boundary wall at IWAI parcels at Pandu, Neamati & Dibrugarh	Q2, 2021
	• Signing of Concessionaire agreement of Pandu & Dhubri Terminal	Q1, 2022
	• Upgradation of Badarpur & Karimganj	Q1, 2022
	• Award of Karimganj & Badarpur terminals on PPP basis	Q1, 2022
	• Construction & Operationalization of Pandu Ship repair facility	Q2, 2023
	• Completion of work for construction of Jogighopha terminal	Q4, 2023
	• Widening of road from Pandu to NH including land acquisition	Q1, 2024
	• Award for improvement of existing approach road for Dhubri Terminal	Q4, 2023
	• Completion of improvement of existing approach road for Dhubri Terminal	Q4, 2024
6.1.3	Other 14 National Waterways (NW5, NW9, NW86, NW8, NW-27, NW68, NW111, NW3, NW97, NW10, NW44, NW4, NW57 & NW52)	
	• SFC approval for undertaking development of proposed waterways	Q1, 2021
	• Operationalization of four no's of floating pontoon on NW-4	Q1, 2021
	• Providing Floating pontoons in Goa Waterways and additional navigational aids if required (NW-27,68 & 111)	Q4, 2021
	• Facilitation of navigational aids in NW-4 (Phase-I: 80 Kms)	Q1, 2022
	• River Information System on Goa Waterways (NW-27,68 & 111)	Q2, 2022
	• Providing floating pontoons on NW-97 along with additional navigation aids and River information system	Q1, 2023
	• Providing floating pontoons on NW-10, 86, 57 & 52 (one pontoon on each waterway)	Q4, 2023
	• Providing navigational aids and River Information System on NW-8 & 9	Q4, 2023
	• Establishing river information system on NW-3	Q4, 2023
	• Development of Four Ro-Ro terminals on NW-4 along with River information system (need basis)	Q4, 2024

Chapter 6 Initiative summary (2/2)

Key activities		Target
6.1.4	Techno-economic feasibility for development of additional waterways	Q2 2022
	• Award for improvement of existing approach road for Dhubri Terminal	
	• Completion of improvement of existing approach road for Dhubri Terminal	
6.2	**Enhance cargo movement across NWs through demand promotion and activation**	
6.2.1	Outreach to 20 potential PSUs and private sector identified in handling 9 key commodities to develop specific action plan	Q1, 2022
6.2.2	Provision of dedicated financial and fiscal incentives by DPIIT and States for promoting industrial set-ups near NWs	Q4, 2025
6.3	**Capitalize additional cargo and ferry potential by building multi-modal connectivity with 4 neighboring countries through infrastructure development, fairway development and ecosystem development**	
6.3.1	Bangladesh	
	• Fairway development from Sirajganj to Daikhowa stretch in Jamuna river, and from Ashuganj to Zakiganj stretch in Kushiiyara	Q1, 2022
	• Award of work for construction of Maia Terminal	Q1, 2022
	• Award of work for construction of Sonamora Terminal	Q2, 2022
	• Completion of study for undertaking Maia–Aricha fairway development	Q3, 2022
	• Construction & operationalization of Maia Terminal	Q2, 2023
	• Construction & operationalization of Sonamora Terminal	Q3, 2024
6.3.2	Nepal (Ecosystem development)	
	• Proposal to get MMTs at Varanasi and Sahibganj Customs notified	Q4, 2022
6.3.3	Bhutan (Ecosystem development)	Q4, 2022
6.4	**Develop 10 Ro-Ro terminals in partnership with State government**	**Q4, 2022**
6.4.1	Tender document finalization and NIT/RFQ issue	Q4, 2020
6.4.2	Bid evaluation, NOC approval and LOA issue	Q1, 2021
6.4.3	Construction completion and operationalization	Q1, 2022
6.5	**Develop Ferry terminals across 60+ locations in partnership with State government on Arth Ganga model**	
6.5.1	Tender document finalization and NIT/RFQ issue	Q3, 2021
6.5.2	Bid evaluation, NOC approval and LOA issue	Q1, 2022
6.5.3	Construction completion and operationalization	Q1, 2023
6.6	**Leverage private participation for terminal development and operations-Ro-Ro (OMT model); Ferry (DBFOT model) and Inter-modal/Multi-modal terminals (EOT/OMD models)**	
6.6.1	Establish dedicated PPP cell	Q4, 2021
6.6.2	Award of terminals for Haldia MMT, Varanasi MMT on EOT Basis	Q4, 2021
6.6.3	Award of 3 terminals for Sahibganj MMT on OMD basis & Pandu terminal, Dhubri terminal.	Q2, 2022
6.6.4	Award of Gaighat terminal on EOT basis	Q3, 2022
6.6.5	Award PPP concession for upcoming cargo terminals across 15 waterways basis detailed assessment	Q4, 2025
6.7	**Reduction in GST rate on input services availed by IWT operators to enable lower mismatch in GST input credit and reduce overall cost of operations**	**Q4, 2022**
6.8	**Enhance integration of inland waterway movement with coastal traffic through modification in vessel policy regulations**	
6.8.1	Modify qualifications of Inland vessels that can move at 2m wave height to enhance availability of vessels for inshore	Q3, 2021
6.8.2	Re-evaluate "Fair weather" and "non-fair" weather conditions for SOC compliance for integrated coastal and inland water movement	Q4, 2021
6.9	**Leverage private participation in dredging operations on royalty-based PPP model to promote sustainable development and "Waste to wealth'**	**Q1, 2021**

Chapter 7 Initiative summary (1/2)

Key activities		Target
7.1	**Infrastructure development and enhancement at select 12 ports for domestic and international cruise terminal development:**	
7.1.1	Mumbai	Q4 2021 Q2 2024
7.1.2	Mormugao	Q2 2022
7.1.3	Cochin	Q1 2021
7.1.4	New Mangalore	Q1 2021
7.1.5	Chennai	Q4 2020
7.1.6	Vishakapatnam	Q1 2022
7.1.7	6 additional ports (Kolkata, Porbandar, Ganpatipule, Diu, Somnath, Konark) basis final technical evaluation	Q4 2022
7.2	**Terminal infrastructure and ecosystem development at 4 theme based coastal destination circuits to activate cruise demand**	
7.2.1	Gujarat– Pilgrimage (Okha, Dwarka, Porbandar, Veraval)	Q2 2022
7.2.2	West Coast – Cultural and scenic (Mumbai, Goa, Kozhikode)	Q3 2022
7.2.3	South Coast – Ayurvedic wellness (Kozhikode, Kochi, Thiru)	Q4 2022
7.2.4	East Coast – Heritage tourism (Rameswaram, Nellore)	Q2 2023
7.3	**Development of domestic and International ferry circuits (Sri Lanka) to promote movement of passengers and cruise**	**Q4, 2021**
7.4	**Finalize Public Private Partnerships model for cruise terminal operations and management under O&M model with trunk infrastructure created by Centre/State**	**Q4, 2022**
7.5	**Establish a dedicated cruise action team Indian Maritime Centre to establish strong governance and overview mechanism for promotion and development of the sector**	**Q4, 2021**
7.6	**Custom charges optimization and standardization to ease passenger movement**	
7.6.1	Reduce custom duty limits to 12 nautical miles in exclusive economic zones	Q1, 2021
7.6.2	Introduce uniform rate in lieu of state wise levies on alcohol consumption and gambling	Q1, 2021
7.6.3	Introduce duty structure on per passenger basis for levy on custom duties on stock	Q1, 2021
7.7	**Streamline GST related issues for cruise terminal/line operators**	
7.7.1	Reduce GST rate on cruise ticket booking to 5/12% in line with rates for airlines	Q1, 2021
7.7.2	Introduce 0 rate goods in cruise to eliminate levy at State and on-board	Q1, 2021
7.7.3	Eliminate IGST levy on import of cruise ships in line with pre-GST regime	Q1, 2021
7.8	**Development of new Standard Operating Procedures (SOPs) and training manuals for immigration center, ports, PHO, CISF etc.**	**Q1, 2021**
7.9	**Establish dedicated cruise training academies in partnership with Global cruise lines to enhance availability of competent talent for cruise ships**	**Q2, 2021 (Target 1)**
7.10	**Dedicated promotional and marketing campaigns to activate and attract global cruise lines and passengers**	**Q1, 2023**
7.11	**Drive five demand enablers identified to generate awareness for cruise sector**	
7.11.1	Active participation at international forums and marketing campaigns are required to acquaint various industry player with India's offering	Q1, 2023
7.11.2	Introduce dedicated market campaign on lines of "Incredible India" for awareness generation and promotion of thematic cruises, wedding cruises, cruises for offsite etc.	Q1, 2022
7.11.3	Marketing partnerships with cruise-lines and airlines for developing comprehensive offering for tourists	Q4, 2022

Chapter 7 Initiative summary (2/2)

Key activities		Target
7.11.3	Marketing partnerships with cruise-lines and airlines for developing comprehensive offering for tourists	Q4, 2022
7.11.4	Extension of leave travel concession benefits to cruising and water transportation to incentivize demand	Q1, 2021
7.11.5	Leverage regional connectivity scheme for development of cruise tourism in under-developed states through contribution of cruise-lines and State government	Q1, 2025
7.11.6	Develop online marketplace portal for cruise booking and information	Q2, 2022
7.12	**Development of 13 lighthouses as day excursion destinations for attracting coastal and ocean cruise passengers**	**Q1, 2024**
7.13	**Holistic development for island infrastructure and ecosystem across Andaman and Lakshadweep to make them an attractive cruise destination**	**Q4 2023**
7.14	**Development of terminal infrastructure and creation of concrete and floating pontoon jetties across the identified circuits for cruise operations2**	
7.14.1	Development at NW 1 and NW 2 along identified circuits	Q2, 2022
7.14.2	Development of NW 100 for night cruises	Q4, 2022
7.14.3	Development of NW 97, NW 8 and NW 73	Q1, 2023
7.15	**Infrastructure development to link river cruise tourism with sea bound locations on Eastern coast within India (Andaman Islands) and outside India (Bangladesh, Myanmar, Thailand)**	**Q1, 2023**
7.16	**Development of a comprehensive River cruise policy with standardized SOPs**	**Q2, 2021**
7.17	**Development of canal tourism master plan and comprehensive governance policy for promotion of canal tourism**	**Q2, 2021**
7.18	**Supporting MOCA program in development of water aerodromes for seaplane movement across prioritized 16 locations to enhance tourism and connectivity**	
7.18.1	Gujarat	Q3, 2021
7.18.2	North–East cluster	Q4, 2021

Chapter 8 Initiative summary (1/2)

Key activities		Target
8.1	**Setting up of a regional BIMSTEC centre in India to cement place as an informal leader**	
8.1.1	Coordinate with BIMSTEC organization and with different ministries MoPSW, MEA, MOF, Trade and commerce, Tourism etc.	Q4, 2021
8.1.2	Focus on issues and development of maritime activities in BIMSTEC region specifically	Q4, 2021
8.1.3	Centre to act as a promotion house to collaborate with foreign powers such as Japan, Aus., EU, etc.	Q4, 2021
8.1.4	Engage with trade associations/councils focusing on promotion of trade in BIMSTEC region–India-BIMSTEC promotion council by ASSOCHAM	Q4, 2021
8.2	**Enhance investment in infrastructure development to improve regional connectivity to facilitate trade**	
8.2.1	Assist development of dry ports / ICDs in landlocked nations Nepal and Bhutan	Q1, 2025
8.2.2	Explore direct sailings from Indian ports	Q1, 2024
8.3	**Mutual Agreements to facilitate intra-BIMSTEC trade**	
8.3.1	Pursue implementation of BIMSTEC coastal shipping agreement	Q4, 2021
8.3.2	Operationalization of BIMSTEC master plan on transport connectivity	Q4, 2023
8.3.3	Promote indigenous shipping industry and associated infrastructure	Q1, 2024
8.4	**Develop capabilities across BIMSTEC nations**	
8.4.1	Provide training and skill development through maritime institutes by attracting BIMSTEC talent	Q1, 2025
8.4.2	Increase interaction between Indian and BIMSTEC ports for adoption of best port practices, intermodal connectivity, SOPs etc.	Q1, 2024
8.4.3	SOPs for seamless crew exchange at BIMSTEC ports	Q1, 2024
8.5	**Implement other identified action items such as common standards, facilitation of trade through collaboration of shipping lines etc.**	
8.5.1	Follow the EU model to establish common standards for data exchange and customs	Q1, 2023
8.5.2	Collaboration of Indian shipping lines with import and export firms of BIMSTEC nations for the transport of cargo	Q4, 2021
8.5.3	Potential set-up of a commercial venture, joint stock BIMSTEC shipping company to focus on shipping opportunities in BIMSTEC region	Q1, 2025
8.6	**Develop additional cruise, ferry and cargo connectivity routes to neighboring countries to establish maritime leadership position**	
8.6.1	Phase 1: Develop cruise, ferry and cargo connectivity with Sri Lanka, Maldives and Bangladesh	Q1,2022
8.6.2	Phase 2: Develop long distance cruise and connectivity with potential countries such as Indonesia and Myanmar	Q1, 2026
8.7	**Extend partnerships with 9 leading maritime nations across 5 areas to develop domestic capabilities (e.g. maritime law, port logistics etc.)**	
8.7.1	Phase 1: develop collaborations with Norway, Hong Kong, Singapore, United Kingdom and USA across the domains of Maritime Law, Maritime Finance and Technology	Q4, 2023
8.7.2	Phase 2: Develop collaborations with South Korea, Singapore, Netherlands across the domains of Ship operations and Port logistics	Q4, 2025
8.8	**Offer India's core expertise to developing countries for collaboration across three domains (Technology Assistance, Infrastructure Assistance, Capability development assistance)**	
8.8.1	Develop partnerships with developing nations to provide technological assistance on topics such as Software and tech platforms, Naval architecture and Ocean engineering and hydrography	Q3, 2025
8.8.2	Develop partnerships with developing nations to provide Infrastructural assistance on port management, Shipbuilding and ship repair and dredging	Q3, 2025

Chapter 8 Initiative summary (2/2)

Key activities		Target
8.9	**Operationalize Chabahar port to drive geo-strategic advantages and establish International North-South Transport Corridor (INSTC) for cargo facilitation from CIS Countries**	**Q4, 2022 (short term) 2030 (Long term)**
8.10	**Appoint permanent representative at IMO London to enhance India's representation at IMO**	**Q4, 2021**
8.11	**Increase India's insurance capacity for maritime sector to reduce dependence of foreign markets for direct and reinsurance**	
8.11.1	Establish primary insurance pool and stakeholder's advisory board	Q4, 2021
8.11.2	Independent and knowledge-based Risk Evaluation – review the evaluation already done for any segment and complete the evaluation for other segments	Q4, 2021
8.11.3	Independent audit of all outstanding and submitted claims	Q4, 2022
8.11.4	Benchmark global best practices and implement Gold Standard across all segments	Q4, 2022
8.11.5	Implement identified recommendations to retain at least 75% of all marine insurances /reinsurances within India	Q4, 2027
8.12	**Develop international leadership by setting maritime Arbitration body for International maritime dispute resolution**	
8.12.1	Identify and comply with recommendations in amended Arbitration and Conciliation Act 2015 to make arbitration process user friendly, cost effective and time efficient	Q4, 2022
8.12.2	Adopt LMAA guidelines and drive industry recognition of IMAA to become one of the top 5 leading maritime dispute resolution centers	Q4, 2030

Chapter 9 Initiative summary (1/3)

Key activities		Target
9.1	**Increase usage of renewable energy to >60% of total energy by 2030 across Indian ports with primary focus on solar and wind**	
9.1.1	Create a central team via bodies such as EESL, NIWE etc. to conduct an energy assessment for Solar and Wind energy opportunities across Major Ports	Q2, 2021
9.1.2	Drive central pooling of port-wise requirements and execute procurement for public/private provider	Q4, 2021
9.1.3	Finalizing procurement of provider to provide renewable energy as per assessment across Major Ports	Q2, 2022
9.1.4	Phase 1- Increase share of renewable energy at ports to 30%	Q4, 2024
9.1.5	Phase 2- Increase share of renewable energy at ports to 50%	Q2, 2027
9.1.6	Phase 3- Increase share of renewable energy at ports to >60%	Q2, 2030
9.2	**Evaluate and pilot advanced energy solutions (e.g. wave, tidal) at select Indian Ports by conducting a detailed feasibility study (e.g. tidal at Deendayal port, wave energy at Cochin port)**	
9.2.1	Conduct a detailed research paper to identify potential of advanced energy and identify commercial and execution feasibility of them in long run	Q4, 2021
9.2.2	Drive execution of pilots and large-scale implementation of advanced energy solutions at identified ports in a phased manner	Q4, 2028
9.3	**Drive adoption of multi-clean fuels (Electric, CNG, LNG) for vehicles in port ecosystem**	
9.3.1	Conduct pilot at select viable ports and incorporate learning from pilot	Q4, 2021
9.3.2	Draft a policy and clear roadmap for adoption of multi-clean fuel across ports	Q4, 2022
9.3.3	Creation of infrastructure at each port (e.g. LNG station, CNG pumps, EV charging stations, etc.)	Q4, 2025
9.3.4	Create non-monetary incentives for trade to shift to alternate fuels (e.g. priority in queue, fast track lane, etc.)	Q4, 2025
9.3.5	Implement clean fuel vehicle program at viable ports to achieve targets	Q4, 2030
9.4	**Provide shore to ship electricity to vessels (tug-boats, coastal vessels and EXIM trade vessels) in a 3-phase targeted manner**	
9.4.1	Onboard intermediary and drive commercialization for providing shore to ship electricity to vessels	Q4, 2023
9.4.2	Phase 1 - Prioritize and provide shore to ship power for port stationed vessels & tug-boats	Q4, 2025
9.4.3	Phase 2 - Prioritize and provide shore to ship power for vessels deployed for coastal navigation	Q4, 2030
9.5	**Electrification program for material handling equipment across all ports**	
9.5.1	Convert cargo handling equipment (e.g. ship to/from shore cargo movers and within-port cargo movers) to electricity driven	Q4, 2030
9.5.2	Mandate purchase of electrical equipment's as replacement for all further purchase to achieve full electrification over the next 10 years	Q4, 2030
9.6	**Establishing LNG bunkering stations at select ports in line with fuel adoption trends by shipping liners**	
9.6.1	Conduct detailed market assessment and identify ports strategically advantaged to provide LNG bunkering facilities	Q4, 2021
9.6.2	Accelerate development of LNG bunkering facilities (already in pipeline)	Q4, 2024
9.6.3	Establish LNG bunkering stations on pilot basis in prioritized select LNG terminal ports for ship-to-ship bunkering	Q4, 2028
9.7	**Increase usage of efficiency enhancements techniques such as ship-tracking and smart-lighting at ports to move towards CO_2 neutrality**	
9.7.1	Conduct pilot at select ports to introduce 'ship tracking' to ensure ships are not held off-shore for extended time period consuming energy; expand coverage to all ports basis learnings	Q4, 2022
9.7.2	Introduce smart lighting through IoE sensors to save energy at select ports on pilot basis; Incorporate learnings from pilot and expand coverage to all ports	Q4, 2023

Chapter 9 Initiative summary (2/3)

Key activities		Target
9.8	**Develop and issue guidelines on dust management to drive ports to adopt to modern practices in a phase wise manner**	
9.8.1	Phase 1-Minimize dry cargo pile heights and build barriers to break winds	
9.8.2	Phase 2-Cover storage and handling areas and use slurry transport and conveyors	
9.8.3	Phase 3-Employ water sprinkling, covering of material by waterproof fabrics, water suppression for loose material; conduct air extraction & treatment through baghouse; employ sensor-based tracking mechanisms	
9.9	**Build infrastructure (sewage treatment plant, hull cleaning)) for sewage waste-water and oily waste treatment and develop oil spill response plans**	
9.9.1	Tendering and award of projects under PPP mode	Q2, 2022
9.9.2	Collaborate with Navy to develop oil-spill response plans	Q4, 2022
9.9.3	Completion of construction and commissioning of sewage plants	Q4, 2025
9.10	**Employ water conservation techniques at select Ports by deploying atomizers and mist canons on pilot basis and expand to other ports post incorporation of learnings from pilot**	**Q4, 2025**
9.11	**Develop green belt (including mangrove, mudflats) cover at ports with participation of corporates under CSR program**	
9.11.1	Develop adequate green belt near material handling area with support of CSR funds of corporates and increase coverage	Q2, 2022
9.11.2	Develop green belt and mangrove in other available land (area beyond material handling) for ports with inadequate land near the material handling area; MoPSW to drive discussion with MoEFCC to exempt active mudflats within CRZ notification framework 2011/2019	Q4, 2022
9.11.3	Provision for compensatory mangrove plantations to be explored with MoEFCC	Q4, 2022
9.12	**Drive adherence to National Action Plan for green shipping for safety and quality of vessels; ensure uniform HSSE regulations and policies across all ports**	
9.13	**Strengthen solid waste & plastic waste management program in alignment with Swachh Bharat Mission & promote waste to wealth**	
9.13.1	Conduct active recycling of waste material & re-usage of recycled material	Q4, 2022
9.13.2	Segregation of solid waste, plastic and biodegradable materials	Q4, 2022
9.13.3	Re-use of bio-degradable/plastic in civil construction and other purposes	Q4, 2023
9.13.4	Promote use of biodegradable waste for production of useful byproduct for public and environmental use	Q4, 2025
9.14	**Employ sustainable dredging disposal mechanism and promote waste to wealth**	
9.14.1	Conduct study for identifying innovative methods for recycling/reusage of the dredged material	Q4, 2021
9.14.2	Collaborate with dredging partners to identify and build port wise strategy & roadmap for recycling and reusage of dredged material	Q2, 2022
9.14.3	Land Reclamation and creation of bunds across ports post evaluation	Q2, 2023
9.14.4	Implementation of identified methods for 1 port on pilot basis	Q4, 2024
9.14.5	Incorporating learnings and expand to other ports in phases -	
	• Phase 1: Extend implementation coverage to min. 4 ports	Q4, 2026
	• Phase 2: Extend implementation coverage to min. 8 ports	Q4, 2027
	• Phase 3: Extend implementation coverage to all ports	Q4 2028
9.15	**Strengthen safety at ports to ensure 'Zero accidents' at Indian Ports**	
9.15.1	Define a risk assessment framework basis MTMSA guidelines	Q2, 2021
9.15.2	Conduct port-wise risk assessment to ensure better management of end-to-end handle hazardous material	Q4, 2021
9.15.3	Finalize port-wise strategy to address identified potential safety risks	Q4, 2021
9.15.4	Institutionalize process to implement safety measures (e.g. Swatchh Sagar portal, annual awards, recognition, etc.) on sustainable basis	Q2, 2022
9.15.5	Digitize and mandate safety inspection and active incident reporting for all workers to driver stringent incident reporting	Q2, 2022

Chapter 9 Initiative summary (3/3)

Key activities		Target
9.16	**Strengthen training program for port workers through a 2-pronged approach to reach 100% staff trained on areas specific to their job**	
9.16.1	Define a comprehensive safety training program for port workers	Q3, 2021
9.16.2	Conduct induction training of port workers on safety precautions specific to their area of operations	Q4, 2021
9.16.3	Recurring training refresher (every 3-5 years) for each worker	Q2, 2022
9.16.4	Incorporate learnings from incident assessment and mock drills & establish regional training CoE's under MoPSW to streamline incidence response	Q1, 2023
9.17	**Conduct process reengineering by redesigning material handling operation at Indian Ports to reduce physical hazards at Indian Ports**	
9.17.1	Conduct port specific traffic study & identify mitigation measures to ensure safety	Q3, 2021
9.17.2	Finalize port-wise strategy to address identified potential physical hazards	Q1, 2022
9.17.3	Implement identified mitigation measures across ports (e.g. setup of one-way vehicle passageways, re-design of materials handling operations, etc.)	Q2, 2022
9.17.4	Institutionalize process to drive continuous improvement and ensure minimal work-related hazards on sustainable basis	Q2, 2023
9.18	**Implement special medical or occupational health services dedicated for port workers aimed at providing swift essential aid for safety to reach 'days lost due to health/safety' to zero**	
9.18.1	Have robust Occupational Health Center with trained medical officers and conduct formal training on occupational health hazards relevant to port for better diagnosis and treatment	Q4, 2021
9.18.2	Strengthen the occupational health services at ports-fast speed boats for ferrying injured/sick person, 24*7 ambulance at port operation premises, stretchers and means to rescue employees from drowning	Q4, 2022
9.19	**Implement a medical monitoring program for port workers by driving active pre-screening and regular documentation on monitoring of worker health throughout the work tenure**	
9.19.1	Establish digital infrastructure (e.g. digital health records) for pre-monitoring screening through medical examinations & history checks at induction	Q4, 2021
9.19.2	Employ continued and periodic monitoring on health conditions	Q4, 2022
9.19.3	Conduct adequate follow ups on diagnosed issues and advise on adapting work on those issues	Q4, 2022
9.20	**Enhance infrastructure capabilities of existing hospitals, bed and staff via viable model of PPP**	**Q4, 2022**
9.21	**Build a real time monitoring program to track key HSE KPIs across ports, shipyards, and ship recycling areas**	
9.21.1	Create a centralized and specialized team to drive E2E monitoring of ports, shipyards, and ship recycling areas	Q2, 2021
9.21.2	Central team to define ambition and reporting framework for HSE parameters along with infrastructure to be installed	Q3, 2021
9.21.3	Ports to conduct HSE assessment, subscribe to standard global target setting programs (e.g. SBTi) and ensure compliance to certifications & international conventions (e.g. ISO 14001, OHSAS 18001, MARPOL 73/78)	Q3, 2021
9.21.4	Drive long-term process institutionalization at ports through deployment of sensors (e.g. for tracking air quality, weather, etc.) and systems to capture data (leverage existing mechanisms as applicable)	Q2, 2022

Chapter 10 Initiative summary (1/3)

Key activities		Target
10.1	**Establish Maritime Knowledge Cluster to drive coordinated and collaborative research**	
10.1.1	Create task force with stakeholders across institutes (IITs, IMUs, MTIs, CEMS, NTCPWC, CICMT, Maritime Law), Maritime industry to setup cluster & on-going co-ordination to identify, allot & track R&D topics	Q4, 2020
10.1.2	Strengthen IMU research focus and partner with 15+ domestic and global institutes for collaborative research	
10.1.3	Onboard/ Partner with 10+ domestic institutes e.g. IITs, IISc, MNLU, NALSAR, NLU (Orissa), GMU etc. for specialized research domains	Q2, 2021
10.1.4	Onboard 5+ global institutes out of prioritized list of 10 research universities (E.g. Bergen university, Erasmus university, IMLI etc.)	Q2, 2021
10.1.5	Allocate 50+ research topics across 5 strategic maritime thrust areas – (1) World class port development; (2) Navigation and sea traffic management; (3) Fleet building and design; (4) Health, Safety, and Environment; and (5) Maritime law, policy & governance across member institutes	Q2, 2021
10.1.6	Create online platform for on boarding partners, publication of papers, knowledge sharing and collaboration	Q4 2021
10.1.7	Onboarding 10+ industry players across 5 sub-segments of ports, ship-building, dredging and logistics targeting 60%+ industry funded projects	Q4, 2022
10.2	**Drive research innovation and technology commercialization through establishing a living lab facility in partnership with NTCPWC & CICMT with a major port**	
10.2.1	Set-up Living Lab in partnership with NTCPWC, CICMT and IMU at one of the 3 major ports (across Mumbai, Vishakapatnam and Chennai)	Q4, 2022
10.2.2	Evaluate set-up of additional living lab at potential locations	Q4, 2026
10.2.3	Leverage existing incubators in CICMT, NTWPWC, and NINI to promote maritime innovation	Q4, 2021
10.2.4	Work with MoPSW to set-up National Marine Incubation Centre as national marketplace of research institutes, startups, VC firms and maritime / logistics industry	Q4, 2025
10.3	**Knowledge cluster to deliberate and publish on strategic goals set by IMO and create base documents for the 5 shadow and 7 base shadow committees in line with IMO committee structure**	
10.3.1	Create DGS IMO Cell as part of knowledge cluster with a core committee to constitute and co-ordinate activities of 12 shadow committees	Q4, 2020
10.3.2	Establish 12 shadow and base-shadow committees with relevant industry members and experts in line with IMO committee structure with competent and relevant stakeholders	Q2, 2021
10.4	**Strengthen Maritime institutions to enhance India's capabilities at par with global standards**	
10.4.1	Introduce 10+ full-time courses at Maritime education and training institutes and other affiliated universities	Q4, 2023
10.4.2	Finalize partnership with World Maritime University to offer co-branded courses across Maritime Law with Maharashtra National law university	Q2, 2022
10.4.3	Finalize partnership with World Maritime University and other global universities to offer 3+ other co-branded courses across Maritime logistics and finance with domestic universities	Q4, 2023
10.4.4	Build alliance with domestic institutes (IITs) to offer co-branded courses	Q4, 2024
10.4.5	Partner with select corporates to institutionalize short-term Professional Development courses / certifications for upskilling working professionals	Q4, 2022
10.4.6	Launch credit accumulation course programs to offer flexibility to seafarers to complete course credits for Post graduate degree through both online/offline mode	Q4, 2022
10.5	**Upgradation of admission process, technology, assessment and evaluation techniques**	
10.5.1	Develop and establish a common entrance examination to streamline admissions process	Q4, 2021
10.5.2	Modernization of training institutes across 5 key areas: Teaching, Administration, Training, pedagogy and assessment	Q4, 2021

Chapter 10 Initiative summary (2/3)

Key activities		Target
10.6	**Strengthen faculty network across Maritime education and training institutes**	
10.6.1	Establish Faculty Development program under IMUs and MTIs to provide two-fold training and development to sea-farers	Q4, 2021
10.6.2	Work with NITTTR to customize upfront training for faculty	Q4, 2021
10.6.3	Work with IITs and IIMs to introduce up-skilling courses	Q4, 2022
10.6.4	Establish specific research targets for faculty for publication in Q1 journals and research-linked compensation	Q4, 2021
10.6.5	Work with domestic institutes like IITs and partner global institutes to expand visiting faculty portfolio	Q4, 2023
10.7	**Drive academic partnerships with 10+ leading foreign maritime universities prioritized to leverage student exchange, curriculum building, brand credibility as well as world class faculty**	
10.7.1	Establish Programmatic collaborations with select 7 universities	Q4, 2024
10.7.2	Evaluate and establish satellite campus in partnership with partner universities	Q4, 2028
10.8	**Improve job opportunities for Indian seafarers by driving increased onboard training slots by :**	
10.8.1	Mandate provision of 1.5 training slots for every 10 persons on-board for foreign flagged vessels in charter with penal provisions for payment in lieu of training for non-adherence	Q4, 2023
10.8.2	Increased marketing and awareness of Indian seafarers globally by leveraging international conferences and hosting conferences in India	Q1, 2021
10.8.3	Leverage MEA and Conduct visits by Indian delegation to large ship-owning countries for driving select bilateral agreements to promote Indian seafarers to foreign ship owners	Q4, 2021
10.9	**Digitize and upgrade CoC assessment mechanism of seafarers through end-end digitization of evaluation, assessment and certification process**	
10.9.1	End- End Digitization of CoC assessment	Q4 2022
10.9.2	Organize mandatory pre-departure training for all Indian Seafarers prior issuance of CDC and CoC	Q4, 2021
10.9.3	Modernize and digitize Recruitment and placement licensing system and implement stringent governance to regulate and improve functioning of RPSLs	Q4, 2021
10.9.4	Build online system for grievance redressal and complaint registration with regular monitoring to have timely redressal of grievances basis clear SOP	Q4, 2021
10.10	**Re-orient and develop existing IMU campuses as 6 Centre of Excellences (CoEs) with specialized domains with enhanced industry collaboration and partnerships with specialized global institutes**	**Q4 2024**
10.11	**Implement training schemes and programs for coastal communities to enhance skills, capabilities and safety**	
10.11.1	Establish Maritime Skill Development Center in partnership to promote maritime specific skill sets with certification responsibilities across sub-sectors of Maritime related activities	Q4 2022
10.11.2	Strengthen India's blue economy to support growth in marine tourism by imparting requisite skills across 6 areas such as Techno-market study, sustainability of coastal tourism, transport access, etc.	Q4, 2022
10.12	**Develop a training scheme for fisherman in deep sea fishing vessels undertaken as a joint initiative of Ministry of Ports, Shipping and Waterways and department of fisheries**	
10.12.1	Adopt technology to ensure safety and efficiency of deep sea fishing	Q4 2022
10.12.2	Development of training facilities and centres of excellence to develop deep sea fishing capabilities	Q4, 2021
10.13	**Develop a Scheme for Coastal Community Development through creation of training centers to promote the blue economy in India**	**Q4, 2021**
10.14	**Establish & promote 3 new full-fledged domestic IMU campuses across Gujarat, Karnataka, Odisha, North-East and additional 5 satellite international campuses in partnership with BIMSTEC and IOR countries**	**Q4 2024**

Chapter 10 Initiative summary (3/3)

Key activities		Target
10.14.1	Domestic: Target opening 3 new campuses across Gujarat, Karnataka and Odisha	
10.14.2	International: Evaluate and engage with 5 potential BIMSTEC countries, Mauritius and other African countries for offshore campuses	Q4, 2022
10.15	**Launch 'Women in seafarer' program including encouragement to undertake onshore jobs, awareness and marketing campaign, incentivizing shipping companies and leveraging scholarships to improve women participation.**	**Q4, 2021**
10.16	**Establish Port Welfare Committee (PWC) across all ports in India to implement shore-based welfare facilities and promote mental well being of seafarers and shore staff in shipping companies**	
10.16.1	Establish Port Welfare Committee across ports	Q4, 2021
10.16.2	Standard template detailing structure, mandate, terms of reference, admin and financial provisions be issued to each Port	Q4, 2021
10.16.3	Continuous welfare program: DGS to tie-up with TISS (Tata Institute of Social Sciences) for offering on-call 24*7 counselling sessions and mental wellness programs	Q4, 2021
10.17	**Modernize and digitize Recruitment and placement licensing system and implement stringent governance to regulate and improve functioning of RPSLs**	**Q4, 2021**
10.18	**Build online system for grievance redressal and complaint registration with regular monitoring to have timely redressal of grievances basis clear SOP**	**Q4, 2021**
10.19	**Participate and actively contribute in Seafarer Excellence Network in the Asia Pacific region to share Indian best-practices and benefit from global learnings**	**Q4 2020**
10.20	**Create a common platform between DGS and GMDSS applying system to provide GMDSS tracking facility to seafarers to avoid fake certification**	**Q4, 2021**
10.21	**Extend social benefits of provident fund, Gratuity and Pension for all ranks of seafarers on all types of ships at no cost to exchequer**	**Q4, 2021**
10.22	**Streamline process of crew change at ports through digitization of clearances and customs through online forms, biometric collection and a single contact point**	**Q4, 2021**
10.23	**Prepare and submit a white paper to ILO for consideration of e-visa on arrival for Indian seafarer at EU countries, Australia, Russia, Argentina, Canada, USA, New Zealand and Romania**	**Q4, 2021**
10.24	**Institutionalize identified reward categories and develop an implementation roadmap (in phases) across maritime stakeholders (ports, coastal & inland, shipping, etc.)**	**Q4, 2020**
10.25	**Enable Major Port trusts to recruit talent for leadership positions from private sector through amendment in existing recruitment provisions & enhancing salary competitiveness**	**Q4, 2021**
10.26	**Refine organization structure for port trusts to drive concession management under landlord model and port led industrialization**	**Q4, 2025**
10.27	**Enhance training & skill development of port employees in line with move towards landlord model and define structured training program for various classes of employees**	
10.27.1	Setting up training simulation centers for crane operators at major container ports to improve efficiency	Q2, 2021
10.27.2	Implement UNCTAD port management program for select port employees in partnership with a leading Indian university	Q4, 2021
10.27.3	Evaluate setting up of an additional joint training program with a leading international port on the lines of JNPT – Antwerp Port Training foundation / Human capital port action program for on-going skill enhancement	Q4, 2020
10.27.4	Collaborate with NSDC / other agencies to create training modules for select priority job roles for port operations	Q2, 2021

सत्यमेव जयते

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भारत सरकार

Ministry of Ports, Shipping and Waterways
Government of India